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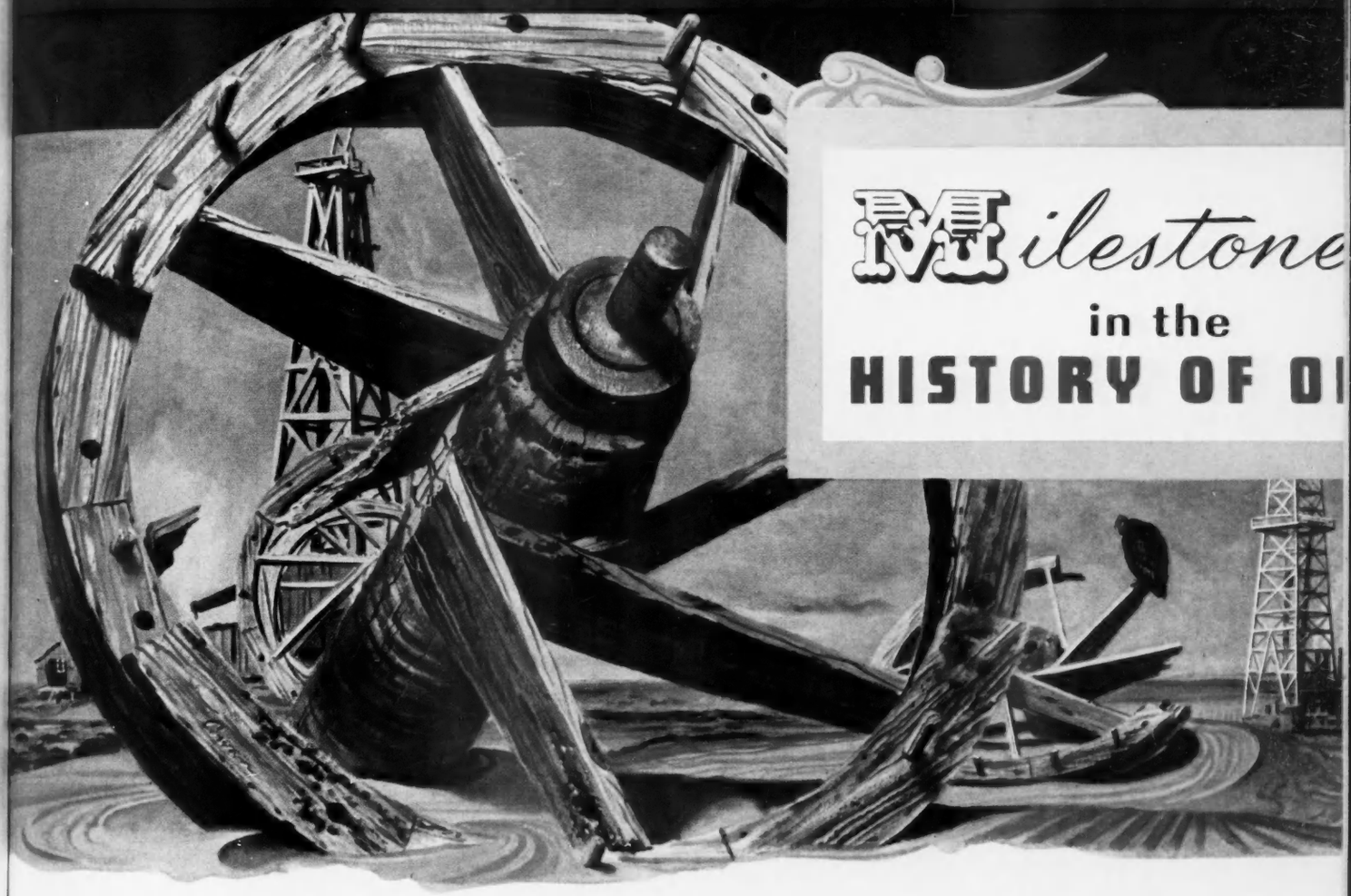
The OIL WEEKLY

FOR THE DRILLING, PRODUCING, PIPE LINE INDUSTRY



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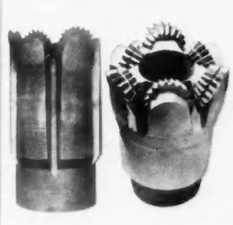

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Published by THE GULF PUBLISHING COMPANY, Houston, Texas

R. L. DUDLEY, *President, Publisher* A. L. BURNS, *General Manager*

TOM W. NELSON, *Advertising Manager*

Specialized Oil Publications of
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The OIL WEEKLY and The COMPOSITE CATALOG for the drilling-producing-pipe line industry

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Looking Ahead

WITH THE EDITOR

THROUGH special arrangement with members of the Council of The Geologists Association, London, "Geology Applied to Petroleum," a series of five articles written by Professor Vincent C. Illing, professor of Geology, Imperial College of Mines & Technology, London, will start in the next issue of THE OIL WEEKLY. Part I, "Petroleum in the Sedimentary Cycle" reflects the importance of geology in the development of the petroleum industry as well as advancements made in sedimentary studies as a result of the interest in oil. Here, fundamentals in the accumulation of oil are presented, and the author discusses the origin of the anticlinal theory of oil traps as advanced by Hunt and Andrews in 1861. Part II, "Types of Regional Structure" applies the anticlinal theory to oil fields in areas of various structural conformities. Part III, a continuation of Part II, deals with other types of structures where oil has been found, particularly faults and salt domes. In Part IV, "Oil Recovery and Exploitation," the development of geological methods used in the discovery of oil reservoirs is surveyed, and the trend toward a more scientific basis in these methods is pointed out. Part V, the conclusion is entitled "Influences of Oil on Geology."

GEOLOGY SERIES

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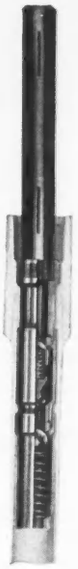

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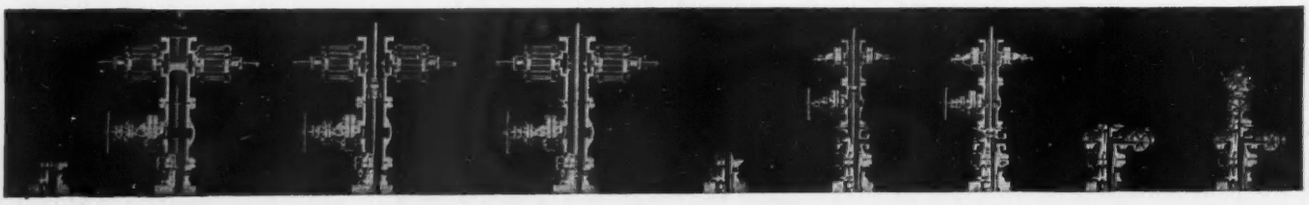

Casing Head Attached | Drilling | Running Casing | Casing Landed | Drilling Control Equipment Removed | Drilling-in and Running Tubing | Tubing Landed | Control Equipment Removed | Manifold Attached

Strippers Aided As Information Pooled

GREATER interest in water flooding is being shown by the average oil operator of Kansas and Oklahoma than ever before. With both states holding their own in the overall production picture, operators in semi-depleted areas are determined to recover as much oil as possible.

Through the efforts of the United States Bureau of Mines at Bartlesville, Okla., and with the support of progressive engineers and the Oil and Gas Division of the United States Geological Survey at Tulsa, the know-how of water flooding is being preached effectively and the stripper areas of northeastern Oklahoma and southeastern Kansas are due for a revival.

During the past few months operators have held several get-togethers at which many phases of water flooding have been discussed. Most recently about 100 operators and engineers met at Independence, Kan., and discuss well spacing, well pattern and flood rate. Operators now plan a field trip for July 24, from Ottawa, Kan., to inspect flood areas of northeastern Kansas. This trip will be conducted by L. L. Brundred of Brundred Oil Corporation.

The industry is conscious of the fact that its stripper production, although not spectacular, is an important backlog and must be maintained. The example set by Kansas and Oklahoma operators should inspire operators in other stripper areas to coordinate their efforts, pool information and help each other in achieving maximum results.

* * *

By reducing fuel consumption from 20 to 50 percent, the high-pressure steam turbine, developed by U. S. Steel's Federal shipyard before the war, increased by 1000 miles or more the distance a ship can travel without refueling—a factor if incalculable importance in fighting Japan.

—Steel in the War.

Atlases Needed!

DESPITE the extra press run of the 1946 WORLD OIL ATLAS, published as the second section of the May 20 issue of THE OIL WEEKLY, the publisher's supply of copies has long since been exhausted, this in face of increasing calls.

We will pay $1. each for several hundred copies. If you have an ATLAS that you will part with in exchange for $1., please write us to that effect and we will send you a stamped envelope to bring it back to us plus, of course, the $1. Do not send in your copy until you hear from us in reply.

Address letters to Circulation Manager, THE OIL WEEKLY.

Stalin's In for It

THE Soviet government has been conducting a bond drive and offering as bait 66 million lottery prizes instead of interest.

Therein, R. L. Duffus, who writes a bit of drollery each month under the title of "A Fair Prospect" for *Nation's Business* thinks he has found a crack in the armor of Russian communism. List:

"The big winners (in the Russian bond lottery) will get nearly $10,000 apiece which by Soviet standards will make them rich. But if they were really living up to their Marxian doctrines, they wouldn't care to be rich—they would wish to contribute as much as they were able to the common stock and receive back what they actually needed.

"A Russian who wants to get $10,000 for nothing is morally worse, by Marxian standards, than an American who plans to start a store or a factory and take out $10,000 in profits. That Russian is a bourgeois—that's what he is.

"I think Mr. Stalin is on shaky ground. Some morning he will wake up and find that he has a lot of human beings on his hands—humans who desire to have fun, take a little risk now and then and get ahead in the world."

Says Development in Latin America Best

GORDON DUKE, president of Southeastern Oil, of Jacksonville, Fla., in a communication to Senator Joseph C. O'Mahoney of the Senate Committee Investigating Petroleum Resources, urges the American oil industry to concentrate its search for foreign oil in Latin America rather than in the Middle East "which might fail us in a time of national peril."

"We must push our hunt for oil nearer home if we are to be wholly free of foreign menace," Duke contents. "Rather than relying on the hazardous venture of petroleum development in far lands so different economically, politically and ideologically from ours, we should turn to those fields of our nearby and friendly Latin American neighbors—fields among the richest of the world in petroleum deposits."

Duke says U. S. petroleum policy should become "a firm link in our chain of friendship" with the American republics. "Capital investment in the oil-producing nations of the Americas and the contribution of our technological skills to the proper development of their oil resources would redound to the benefit of both continents. The difficulties which we have already experienced in our hunt for oil everywhere beyond the Americas should prompt us to pause and ponder before we involve ourselves inextricably in foreign commitments."

There is no arguing the point that Caribbean area oil proved a great wartime asset.

* * *

"The summary of the cost of the government scientific research program indicates the size of the expenditure contemplated and the extreme controls on the use of the appropriated funds. It also illustrates the thinking of those who have operated this government for many years on an unbalanced budget and placed the citizens of the country under the largest financial debt in history."

—Minority Report, Senate Military Affairs Committee.

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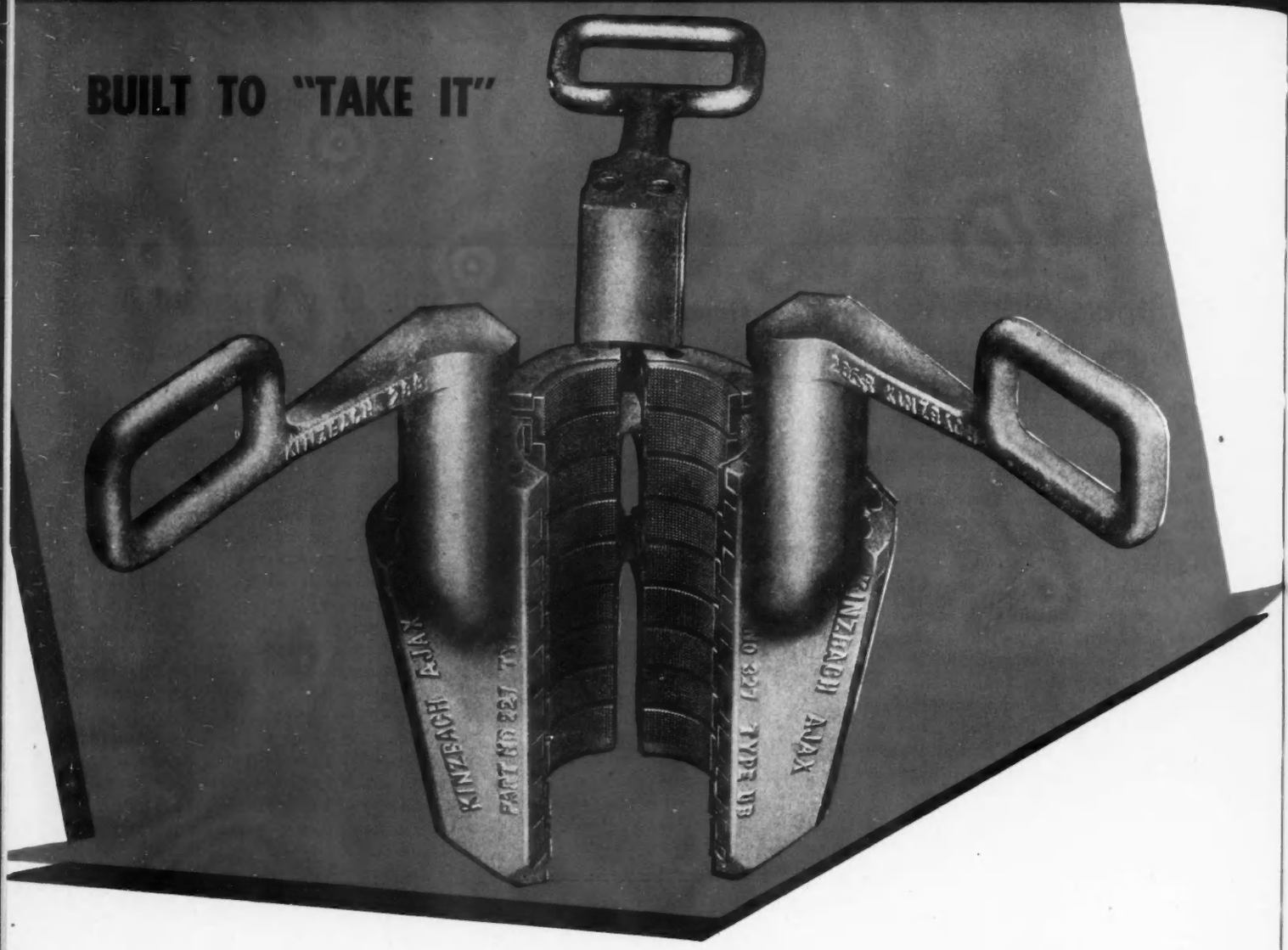

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The Week's News

OPA and Oil Prices—Immediate price changes in either crude or refined products are not looked for until Congress settles the future of price regulation, though price increases are eventually expected. Story below.

Strippers Hope for Subsidy—Subsidy payments on stripper well and other high-cost oil, in abeyance since the termination of OPA, are expected to be resumed and made retroactive to July 1 if new legislation is enacted. Page 26.

Leasing Bill Prospects—Legislation for encouragement of public land development took what is likely to be its final form last week when the House Public Lands Committee made a favorable report on the Hatch-O'Mahoney bill providing for a flat 12½ percent royalty on new discoveries, with a few amendments. Page 27.

Crude Demand Increasing—Crude demand is outstripping even the latest Bureau of Mines long-range forecasts and will call for the production of 4,748,000 barrels daily during July as compared with 4,670,000 barrels in June. A 4,750,000-barrel average is looked for through the third quarter, and a new review of the prospects for the last half of the year will be issued by the Bureau next month, superseding that released early in June. Page 29.

Government Fiscal Report—Federal revenues for the fiscal year just ended were approximately $3400 million under those of the 1945 fiscal year, with a drop in the oil-tax collections accounting for $20 million or more of that amount. Overall expenditures were $35 billion under 1945, and the deficit of slightly less than $22 billion was the lowest in a number of years and down $32 billion from 1945.

Petroleum Council Functions—Temporary Chairman Walter S. Hallanan of the National Petroleum Council named the membership of the organization committee and called it for a meeting in Washington to discuss with Secretary Krug and Acting OGD Director Davies the set up, authority and functions which it is to formulate. Page 27.

Reorganization Plan—Only one week remains in which the Senate can take action which will halt President Truman's reorganization plans calling for transfer to Interior of jurisdiction over mineral deposits under Agriculture Department lands and combining the General Land Office with the Grazing Service. The House already has disapproved the plans, but unless the Senate acts they will become effective automatically Page 29.

Kuwait Oil to U. S.—The first shipment of Persian Gulf oil, 100,000 barrels from Kuwait, is due to arrive at Philadelphia during July. Page 30.

FPC Natural Gas Hearings—During the FPC hearings on natural gas last week, abbreviated by the holiday period, rail and coal interests reviewed their important role in national security in suggesting that rulings on end use of gas might be in order. Increased diesel use shown. Page 28.

Oil Companies Inclined to Wait Before Revising Petroleum Prices

The oil industry, just as it has been for the past several years, is still "waiting on action" in Washington before doing anything about boosting the price of crude oil and products.

Even though the Office of Price Administration died at midnight June 30, it is most unlikely that any price changes will be made in either crude oil or refined products until Congress has settled the matter of what will be done on price regulations. Even if OPA's demise is permanent, it is unlikely that there will be upward price revisions for two to six weeks, a survey by THE OIL WEEKLY among large purchasers and refiners of crude oil revealed last week.

Without a doubt there will be price increases eventually in crude oil and products in the event OPA is permanently discarded. Nevertheless, in no instance did THE OIL WEEKLY encounter a company which took a position that there should be immediate price increases, although all said that price advances in both crude and refined oils were long over due because of heavily increased costs of producing and refining.

Costs Have Increased

"Oil is one of the few commodities which is selling at practically the same price it was selling at in prewar days," one company executive said. "It is well known that drilling and producing costs have increased substantially. The same thing applies to our costs of refining.

"There have been material wage advances and no corresponding price advances, but insofar as our company is concerned we have no disposition to take advantage of the situation existing in Washington at this time and even if OPA should be permanently removed from our governmental processes, it would be our disposition to proceed in a conservative manner, basing such increases as may come in the future on the additional costs we are experiencing," he said.

Increases Inevitable

Another executive said that nothing will be done about revising crude prices upward as long as there is a possibility of OPA being reinstated. It was this executive's opinion that even with OPA out of the way, major buyers will not rush forward immediately with a price increase for fear of public reaction.

He stated that major buyers can take the heckling by independent producers when price increases are delayed much better than they can withstand radio and newspaper razzing for jumping the price immediately after the demise of OPA.

This executive said he is reasonably certain that price increases are inevitable but believed that the increases will be in the form of a series of small raises instead of a big lump in order that gasoline prices may be altered proportionately."

Oil executives in California predicted price increases for some crudes but not an overall boost. They pointed out that heavy crude in California has been given a substantial rise since prewar days and that in some California fields 14- and 24-gravity crudes were selling for the same price, which should be corrected.

Some executives were inclined to believe that the retail price of gasoline could go up 2 cents a gallon without public resistance.

25 Cents Mentioned

Although most executives would not express themselves on the exact amount of the expected increase, some did mention 25 cents per barrel on crude and one cent a gallon on the retail price of gasoline as the maximum.

One large independent purchaser of crude oil said the oil industry "has better sense than to kick itself in the teeth" by increasing prices now.

"Why speculate?" said a company executive. "We will follow the leader."

House Approves Bill for Sale of Government Oil

The House last week passed and returned to the Senate legislation authorizing the Secretary of the Interior to sell government royalty oil to small refineries without their own sources of crude supply.

The House Public Lands Committee made several minor amendments to the measure as passed by the Senate, one permitting the Secretary to prorate the oil when there are two or more applicants for a volume of oil insufficient to meet the needs of all.

The bill authorizes the sale of royalty oil to refiners when the Secretary of the Interior determines that sufficient supplies of crude are not available to them in the open market. The Secretary may sell the oil at private sale but at not less than the market price.

Congressmen Getting Information from Both Sides in Fight Over Cooperatives

Pressure of other business and deferment of general tax revision has kept the farmer cooperatives from becoming an issue in Congress, but behind the scenes an intensive fight is being waged for Congressional support favoring or against continuance of the present tax exemptions granted such organizations.

Each side has charged the other with conducting organized propaganda in behalf of its aims, and both are right because a volume of educational material and many communications have reached Congressmen.

The Internal Revenue Bureau is collecting information regarding co-op incomes, profits and taxes which it will make available to the House Ways and Means Committee.

House Committee's Views

The House Small Business Committee, however, recently issued a report holding that the tax-exempt organizations "apparently" have an advantage over competitive business but contending that the tax exemption has no bearing upon any competitive advantage which the cooperatives might have. The burden of the committee's report appeared to be that any business concern which chose to operate on a non-profit basis could get the same advantages as the cooperatives. No comment upon co-op activities in the field of petroleum.

It is expected that the Internal Revenue Bureau will recommend at least that the regulations surrounding the tax exemptions granted to cooperatives be tightened up to prevent evasions, intentional or otherwise.

Demand will be made from other quarters, however, that the tax privileges granted co-ops be lessened or eliminated.

Much of the opposition to the co-ops is coming from the Middle West, where they have their greatest strength. From Minnesota, for instance, business men are complaining that expansion of the co-ops, the mutual organizations and government-operated businesses is threatening the small private operator.

As set forth in communications reaching Washington, the co-ops contend that they themselves make no profits, all gains being distributed pro rata to patrons and thus becoming taxable income.

The other side points out that the greater part of the co-op membership is in the lower income brackets and very little tax revenue is derived from these gains, and take the position that the co-ops should pay the income tax on all profits before any return to patrons, the same as any corporation, and should look for their competitive advantage to the fact that by eliminating the middle man all along the line they can sell on a lower cost margin and thus, despite taxes, make a profit for their members.

A major source of irritation to businessmen is that while the co-ops pay no income taxes they can, and probably do, avail themselves of all the aids given by the government toward the development of business. Thus, it is contended, they have the same advantages of federal reporting, suggestions and representation as do their competitors without bearing any of the cost.

Pennsylvania Grade Association Officers

Officers of the Pennsylvania Grade Crude Oil Association, elected in Pittsburgh, June 27 are shown above. From left to right: H. A. Logan, director, United Refining Company, Warren, Pa.; Fayette B. Dow, vice president and general counsel, Washington, D. C.; D. T. Ring, president and vice president of Preston Oil Company, Columbus, Ohio; Samuel Messer, treasurer, with Quaker State Oil Refining Corporation, Oil City, Pa.; W. F. Clinger, retiring president, Clinger Oil & Gas Company, Warren, Pa.; W. C. Wenzel, executive manager of the Association, Oil City. Officers not shown in the picture are B. T. Haskins, first vice president, Ebenezer Oil Company, Wellsville, N. Y.; G. J. Hanks, second vice president, and president of South Penn Oil Company, Bradford, Pa.; W. R. Reitz, assistant treasurer, Quaker State Oil Refining Corporation, Oil City; and C. L. Suhr, also assistant treasurer, The Pennzoil Company, Oil City.

Continuation of Stripper Subsidies Is Hoped for

Stripper-well operators were left hanging on the hook last week when price control went into a coma and premium payments were no longer legal, but the reaction in Congress, industry and the country at large gave promise that OPA was down merely for a long count and would rise again.

The House quickly passed a resolution extending OPA until July 20, to give Congress time to work out legislation that would be acceptable to President Truman, and at the end of the week the Senate managed to get down to consideration of new price controls.

If new legislation is passed, and there is every reason to believe it will be, things will pick up where they left off when the President's unexpected veto of the extension bill handed him by Congress resulted in a suspension of OPA June 30.

Once the legislation is enacted, subsidy payments on stripper-well and high-cost oil will be resumed and will be made retroactive to July 1, so that operators, in the end, will suffer no loss.

Dallas Nomads Chapter

A Nomads chapter was organized at Dallas June 28, and the following officers were elected: Noble A. Endicott, Continental Supply Company, president; Arthur A. Burrell, Cooper-Bessemer Company, vice president; L. A. Little, Lufkin Foundry & Machinery Company, secretary; E. G. Schroeder, Lucey Products Corporation, treasurer; C. A. McClelland, International Derrick & Equipment Company, and S. S. Parker, National Tank Company, regents; R. J. Bauer, Gardner-Denver Company, sergeant-at-arms; and R. B. Moody, Jarecki Manufacturing Company, assistant sergeant-at-arms. W. G. Green, Tulsa chapter and chairman of the board of regents, presided at the installation of officers.

Group Headed by Kluth

Emil Kluth, vice president of Pacific Western Oil Corporation, was elected chairman of the Conservation Committee of California Oil Producers at the annual meeting recently in Los Angeles.

Lot Bowen of Western Gulf Oil Company was elected first vice chairman; E. J. Bartosh, Bankline Oil Company, second vice chairman; and E. Robert Burns, of MacDonald and Burns, secretary.

The new Conservation Committee for the ensuing year was organized.

House Committee Accepts 12½ Percent Royalty Proviso in New Leasing Bill

A 12½ percent royalty on new discoveries of oil or gas on the public lands is assured as a result of the action last week of the House Public Lands Committee in accepting that provision of the Hatch-O'Mahoney bill to encourage development.

The committee, however, made several changes in the measure designed to meet objections raised by the Interior Department, among them eliminating all reference to lands transferred to the department by executive order for Indian use, leaving those lands as they exist at present, subject to future consideration by Congress.

The most important changes were with respect to the royalty provisions, one designed to lessen the department's difficulty in determining the productive limits of existing deposits and allowing it very considerable latitude in that respect so that only those lands the development of which is clearly extremely hazardous will be granted the 12½ percent rate.

1941 Date Taken

The amendments also confine the minimum royalty to leases which are now entitled to it under the O'Mahoney Act of 1942, the committee, in its report, explaining that it apparently was intended that the rate should be extended to new discoveries after May 27, 1941, and not merely to those made after December 24, 1942, the date of the act.

These amendments, it was pointed out eliminate entirely or substantially reduce the estimated loss of royalty income from the Elk Basin field and other fields referred to by Secretary Krug in a report on the bill to the committee (THE OIL WEEKLY, July 1).

Another amendment, designed to meet Krug's objection that the bill as passed by the Senate might permit several lessees to combine to take over more than the statutory maximum acreage in common ownership, provides that any interest held as a tenant in common shall be charged against the total acreage permitted to be held by a person under the act.

As reported to the House, the new royalty provision requires the Secretary of the Interior, upon application, to issue a new lease in exchange for any lease issued for a term of 20 years, or any renewal thereof, of any lease heretofore issued in exchange for a 20-year lease, to be for a primary term of five years and so long thereafter as oil or gas is produced in paying quantities and at a royalty rate of not less than 12½ percent, except that the royalty rate shall be 12½ percent as to "(1) such leases, or such part of the lands subject thereto, and the deposits underlying the same, as are not believed to be within the productive limits of any producing oil or gas deposit, as such productive limits are found by the Secretary to exist on the effective date of this act, and (2) each oil or gas lease on which a discovery is made after May 27, 1941, which is entitled to the benefits of the Act of December 24, 1942, or which is included in any unit or cooperative agreement approved prior to discovery."

No Loss in Income

"With these amendments," the House was told, "the committee is of the opinion that there would be little, if any, reduction in present royalty income from present production under existing oil and gas leases, and that the accelerated exploration and development which will be brought about in the future by the flat 12½ percent royalty will more than offset any possible future loss of royalty income. The committee is of the opinion that a flat 12½ percent royalty, which is the rate commonly prevailing throughout the petroleum industry on exploratory leases, is essential to the full development of the public domain reserves for oil and gas."

MER Hearing

The Texas Railroad Commission will hold a hearing on September 4, in Austin, to determine the highest productive capacity that can be attained without causing preventable waste in several fields in North Texas.

The fields are located in Archer, Baylor, Clay, Cooke, Foard, Jack, Montague, Wichita, Wilbarger and Young counties.

Slap at Tobey Traced to Parten's Refusal of Post

President Truman's recent snappish letter to Senator Charles W. Tobey of New Hampshire, charging that the latter's treatment of Edwin W. Pauley was making it difficult to get good men to fill high government posts, was traced last week to the declination by Texas oilman Jubal R. Parten of an appointment as head of the three-man Council of Economic Advisers set up under the "full employment" act.

The wartime PAW director of transportation and later aide to Pauley on his European reparations mission, visited the White House a couple of weeks ago to talk about the job with President Truman. He had been sponsored for the post by Texas Democratic leaders in Washington, and was highly acceptable to everybody concerned.

Although the President urged Parten to take the job, the oilman is said to have remembered the treatment accorded Pauley when his appointment as Undersecretary of the Navy was pending before the Senate and begged off. Other men prominent in industrial circles are reported to have felt the same way about facing Senate committees.

Tidelands Title Claim

Both houses of the Louisiana Legislature have joined in petitioning Congress to give to the state title to tidal lands along its coast.

The state of Louisiana claims lands as far as 30 miles out in the Gulf, and it has already leased certain tracts well beyond the three-mile limit.

Petroleum Council Organization Group To Hold Meeting This Week in Capital

Membership of the 15-man committee which will develop and recommend the type of organization of the National Petroleum Council and fix its scope of authority and function, was named last week by Temporary Chairman Walter S. Hallanan, who summoned the members to Washington to meet with Interior Secretary J. A. Krug and acting director of the OGD Ralph K. Davies July 9.

The committee will discuss the broad policies and principles to be followed in working out its assignment, on which it is to report to the next quarterly meeting of the council in September.

Hallanan announced that the organization committee would consist of A. Jacobsen, president of Amerada Petroleum Corporation, New York; B. A. Hardey, president of the Independent Petroleum Association of America, Shreveport, La.; George A. Hill, Jr., president of Houston Oil Company of Texas, Houston; W. Alton Jones, president of Cities Service Company, New York; A. C. Mattei, president of the Honolulu Oil Corporation, San Francisco; B. L. Majewski, vice president of the Deep Rock Oil Corporation, Chicago; Charles F. Roeser, president of Roeser and Pendleton, Inc., Fort Worth; Frank M. Porter, president of the Mid-Continent Oil and Gas Association, Oklahoma City; J. Howard Pew, president of Sun Oil Company, Philadelphia; Robert E. Wilson, chairman of the board of Standard Oil Company (Indiana), Chicago; B. Brewster Jennings, president of Socony-Vacuum Oil Company, Inc., New York; O. D. Donnell, president of The Ohio Oil Company, Findlay, Ohio; Eugene Holman, president of Standard Oil Company (New Jersey), New York; Joseph E. Pogue, vice president of Chase National Bank, New York, and J. Frank Drake, president of Gulf Oil Corporation, Pittsburgh.

While the council is preparing to organize itself, Davies is seeking to have all other federal agencies with an interest in oil name representatives on the government interdepartmental committee. It is hoped to have both bodies ready for concrete activities by Labor Day.

National Defense Cry Used in Coal And Rails in Natural Gas Hearings

Spokesmen for the railroad and coal industries last week raised the cry of national defense as a basis for suggestions that end-use restrictions be imposed on natural gas to protect rail freight revenues and coal miners' jobs.

Appearing before the FPC, the rail and coal representatives flooded the hearing room with exhibits describing what has happened and is happening to freight traffic and employment in the coal industry.

Bearing down heavily on the theme of national security, J. H. Parmalee, director of the bureau of railroad economics of the American Association of Railroads, pointed to the 1,000,000-barrel-a-day oil movement during the war as an example of the service which the railroads might be called upon to render again.

Parmalee left no doubt in the minds of the commissioners that the carriers considered their handling of the oil problem one of their outstanding achievements, submitting an exhibit showing how the movement rose from an average of 88,890 barrels daily in September, 1941, to 1,003,976 barrels in July, 1943, after which the movement turned downward, dropping to 82,140 barrels by September, 1945.

Met War Demands

"The war made tremendous demands on the railroads and they met the demands in full," he said. "This strikingly shows the economic value of this important agency of land transport to the American nation. The war showed, too, that if the railroads can obtain and retain a sufficient volume of traffic, they can earn enough to place them upon a sound financial basis.

"Sound national policy, such as is clearly set forth in the declaration by Congress of its transportation policy in the Transportation Act of 1940, calls for the maintenance of every system of transportation in the United States in healty condition. This cannot be brought about unless the interests of every agency of transport, and especially the railroads, are safeguarded against uneconomic competition."

Asked whether "uneconomic competition" meant natural gas, the railroad witness said "no" and explained that he meant subsidized forms of transportation, although he suggested that irreplaceable natural resources should not be used extravagantly and that the use of natural gas should be confined to an area fairly close to its production.

Class I railroads last year used 25 times as much diesel fuel as in 1935 and more than twice as much fuel oil, but only about twice as much coal, it was shown. The figures on purchases were $23,298,465 for diesel fuel last year against $668,439 in 1935; $121,396,163 for fuel oil against $51,768,259, and $356,722,076 for coal against $177,315,798.

Fears that the production of oil and gas-burning equipment in volume will further limit coal markets, witnesses for the coal industry emphasized the necessity of making use of our 6000-years' supply of coal, and compared that vast supply with the more limited volume of natural gas resrves.

The spread of natural gas competition, the commission was told, will imperil the coal miners' billion dollar payroll and operation of more than 6000 mines in 28 states.

There were indications during the hearings that if the commission ever imposed end-use restrictions on natural gas, a move would be made to have the same regulation applied to fuel oil, which is second only to gas in taking over coal markets.

It was apparent that the rail and coal industries found no natural ground from which to attack gas, necessitating their pleas for the imposition of arbitrary restrictions upon its use on the ground of conservation.

In the earlier testimony, coal and coke industry representatives pointed out that when natural gas came into direct competition, their business was seriously curtailed.

Coke Ovens Affected

Some of the facts brought out by Don Culton, counsel for the Natural Gas Industry Committee, show that natural gas would meet little difficulty in finding domestic and industrial markets in areas served by coal and coke oven gas.

On cross-examination by Culton, W. R. Morris, vice president, Seaboard Division, Koppers Company, declared that none of the properties of his company have their wholesale prices for their products set by any regulatory body. Morris said Koppers and Solvay Company have built all of the by-product coke oven plants constructed in the country in the last few years.

After stating that most of the coke plants are about 25 years old, Morris admitted that the average life of coke ovens is about 25 years. Culton thus developed the thought that most of the plants have been entirely depreciated and that if they were forced to close down the investment loss would be small.

In cross-examination of William H. Earle, president of the Philadelphia Coke Company, Culton brought out that Earle's paper sought to show the adverse effect on the people in the community when natural gas replaces coke ovens. Earle did not know how the population in Geneva, N. Y., has been affected or whether additional industry has been located there, but that there had been an increase in sales of gas there since natural gas came in. The coke plant which existed in Geneva in 1934 could not have furnished the gas which is now being served, he admitted.

Earle said that coke plants in Chicago and Detroit are still providing manufactured gas for mixing purposes since natural gas was piped in. Culton drew from Earle an expressed fear that the Big-Inch lines might be used for natural gas, and that this gas probably would be mixed with manufactured gas and sold at a price to attract greater consumption. Earle said that the consumer should be allowed to use whatever fuel he desires and can afford.

Edmund O. Rhodes, manager, technical development, tar and chemical division Koppers Company, agreed with Culton that manufactured gas prices are as high as they are partly because the gas manufactured from the coke subsidizes the price of various chemical raw materials manufactured from the coke.

Gas for "Higher Uses"

John Maher, of the Maher Coal Bureau and Lake Michigan Docks Association, contended that FPC should regulate the end use of natural gas and that the gas should be used only for "higher uses." He indicated his approval of the position taken by certain Louisiana State officials—keeping the natural gas in the Southwest—and said he believed the FPC should consider, in acting on certificate applications, whether the use of natural gas in the Great Lakes area will hurt other industries. By "higher uses," he said he did not mean that gas should be restricted from competition with coal. He felt the desires of consumers should be secondary to the national economy.

After declaring that end use of natural gas should be controlled, Maher asserted that he did not believe the people of Wisconsin should be allowed to determine what use they should make of natural gas if it were to be brought into that state, but could offer no suggestion as to how far FPC should go in determining proper end use. Maher said he thought it was all right to burn gas under boilers in Texas, but it is improper to burn gas under boilers in Wisconsin despite the fact he said his interest was primarily conservation.

Maher would not answer Wesley E. Disney, counsel for the Natural Gas Industry Committee, as to whether the end use doctrine should be applied to fuel oil.

The commission this week will go further into the coal and railroad situations and will hear also from representatives of organized labor, and next week will begin to receive the testimony of the natural gas industry committee.

Company Ruled in

The FPC has ruled East Ohio Gas Company to be a "natural-gas company" within the meaning of the Natural Gas Act and has directed it to comply with orders requiring the filing of a statement of the original cost of its properties, the reclassification of its accounts in accordance with the uniform system set up under the act, and the filing of annual financial and statistical reports.

The company had contended it was not subject to the provisions of the act.

July Forecast Jumps Demand; Bureau To Revise Outlook for Last Half 1946

A July demand for 4,748,000 barrels of domestic crude oil daily was forecast last week by the Bureau of Mines as officials prepared to revise the long-range forecast issued last month for the final half of the year, in recognition of a continued demand materially in excess of anticipations.

The July average is 74,000 barrels daily above that for June, and it is expected that third-quarter demand will continue at that level or better. Bureau records show that demand has been increasing steadily, the actual in March being 4,608,000 barrels daily and the indicated for April increasing to 4,670,000 barrels and for May to 4,790,000 barrels, a rate which is believed to have continued through June.

"The latest current data available indicates that demand for domestic crude petroleum in the second quarter of 1946 may approximate 4.75 million barrels daily, about 2 percent greater than was originally forecast," the bureau commented. "From present indications, demand may continue at about this rate during the third quarter unless an excessive increase in stocks of refined oils should occur."

Gasoline Stocks Reduced

The yield of gasoline from crude, 37.8 percent in the first quarter, is estimated at 38.8 percent for the second quarter, but stocks of finished gasoline increased only 5.8 million barrels during the first three months and may have been reduced by as much as 12 million barrels in the second quarter. Total demand for motor fuel was 171.4 million barrels in the first quarter and may be about 202 million barrels for the succeeding three months. Exports in the second quarter, however, are believed to have been substantially lower than anticipated.

Crude runs to stills averaged 4,609,000 barrels daily in the first quarter and are estimated at 4,760,000 barrels daily for the second quarter. With the maintenance of relatively low gasoline yields, it was pointed out, the increase in runs has resulted primarily in a larger production of fuel oils than was anticipated.

Despite the heavy activity, operations are not resulting in the buildup of excessive stocks of refined products, bureau officials said. This is particularly true of residual fuel, which is still tight, and there has been heavy buying of light oils in advance by distributors and consumers, apparently in anticipation of price increases in the near future.

The revised forecast for the last half of the year will be issued next month.

Texas Is Upped

In forecasting July demand, the bureau increased the production rate for eight states and the "other" area, reduced it for four and left eight unchanged. The greatest change was in Texas, where demand was placed at 2,110,000 barrels daily against 2,050,000 barrels for June, narrowing the spread between bureau calculations and Texas Railroad Commission allocations.

The other states increased were Oklahoma, from 380,000 to 384,000 barrels daily; Kansas, from 255,000 to 260,000 barrels; Wyoming, 104,000 to 112,000; Mississippi, 57,000 to 60,000; Michigan, 46,000 to 47,000; Colorado, 26,000 to 28,000; Indiana, 18,000 to 19,000; and "other," 1000 to 1200 barrels.

Decreases were forecast for California, 848,000 to 844,000 barrels; New Mexico, 98,000 to 97,000; Arkansas, 79,000 to 78,000, and New York, 14,200 to 14,000 barrels. States unchanged were Louisiana, 380,000 barrels; Illinois, 210,000; Pennsylvania, 34,000; Kentucky, 31,000; Montana, 22,000; West Virginia, 8400; Ohio, 7600, and Nebraska, 800.

Gas Tax Unchanged

Another gas tax bill, one calling for a sales tax on natural gas of 1½ cents per thousand cubic feet, was defeated by the Louisiana Legislature last week.

The concensus is that the gas tax status will remain unchanged from its present ½-cent per 1000 cubic feet gathering tax.

Crude Oil Production in the United States

(Estimates compiled by THE OIL WEEKLY. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED July 6	June 29
Alabama	1,150	1,150
Arkansas	73,500	73,800
California	880,700	884,100
Colorado	33,000	32,000
Florida	350	200
Illinois	211,400	206,350
Indiana	20,000	19,900
Kansas	239,300	260,300
Kentucky	30,700	30,750
Louisiana	382,150	377,600
North Louisiana	81,500	81,500
South Louisiana	300,650	296,100
Michigan	47,750	47,500
Mississippi	63,550	63,800
Missouri	100	100
Montana	25,250	25,000
Nebraska	800	750
New Mexico	99,400	98,850
New York	13,500	13,500
Ohio	8,500	7,800
Oklahoma	383,350	387,100
Pennsylvania	44,000	37,000
Tennessee	35	35
Texas	2,227,550	2,243,750
Tex. R. R. Comm. Districts:		
Dist. 1—S. Central	19,500	19,650
Dist. 2—Lower Gulf Coast	158,100	155,650
Dist. 3—Upper Gulf Coast	511,350	515,400
Dist. 4—S. West	228,000	229,600
Dist. 5—E. Central	44,150	43,950
Dist. 6—E. Texas Field	315,000	326,000
Dist. 6—Rest of N. East	107,800	107,350
Dist. 7-B—W. Central	32,000	32,400
Dist. 7-C—West	28,000	28,450
Dist. 8—West	569,150	566,450
Dist. 9—N. Central	129,300	132,400
Dist. 10—Panhandle	85,200	86,450
West Virginia	9,800	8,750
Wyoming	111,250	111,000
Total United States	4,907,085	4,931,085

Federal Oil Revenues Show Considerable Drop

Treasury revenue from the taxes on lubricating oil, gasoline and pipe line transportation for the fiscal year ended June 30 will be $20,000,000 or more below the total for the preceding fiscal year, the Internal Revenue Bureau has indicated.

For the first eleven months of the year lubricating-oil collections were $68,362,624, a $10,965,683 drop from the same period the year before; gasoline receipts were $366,657,278, a drop of $3,878,829 and pipe line movement paid $13,741,754, a drop of $1,238,955.

For the first five months of 1946, $24,862,741 was collected from lubricating oil, a drop of $15,000,000 from last year; $144,630,688 from gasoline, a drop of nearly $23,000,000, and $6,042,044 from pipe line transportation, a drop of $630,000.

For May alone the collections included $4,659,536 from lubricating oil against $9,924,124 last year; $29,061,094 from gasoline against $42,631,374, and $1,228,920 from pipe lines against $1,585,845.

Senate Must Act Soon on Plan for Reorganization

President Truman's reorganization plans, involving the transfer to the Interior Department of jurisdiction over mineral deposits on lands held by the Department of Agriculture and the merger of the General Land Office and the Grazing Service, are pending before the Senate, where action must be taken before July 15 if the plans are not to be put into effect.

The House of Representatives already has disapproved all three of the plans submitted by the President May 16. Under the reorganization act, such plans automatically become effective if adverse action is not taken by Congress within a period of 60 days.

If the President's plans are rejected it will be for reasons other than the two changes involving the Interior Department, and House disapproval was based on the plan to set up a department of social welfare under the Federal Security Agency, the consolidation of housing activities, and abolishment of the Social Security Board by transfer to the Federal Security Agency.

Tide Water Associated Honors Its Old Employes

Tide Water Associated Oil Company at a recent "Diamond Service Emblem Dinner" in Tulsa honored Mid-Continent division employes with 25 years or more service. E. H. Salrin, Houston, vice president in charge of the division, made the awards, including one to Wallace K. Porter, a pumper of Keifer, Okla., who joined the company in 1913. The company has 149 employes in the Mid-Continent division with 25 or more years of service.

The Illinois division dinner was held earlier in June and the Texas meeting is scheduled July 18 at Tyler.

Borneo Oil Industry Restoration Reported Progressing Satisfactorily

Restoration of the oil industry in Borneo is proceeding at an encouraging pace, according to a recent report received by the Department of Commerce from the Netherlands East Indies.

When Tarakan was liberated in May, 1945, most of the oil fields and virtually all the storage tanks and buildings had been destroyed. Production at the time of the report amounted to 600 tons (about 4680 barrels) daily, and it was anticipated that by the end of 1946 the daily output would be 1500 tons (about 11,700 barerls), or 75 percent of the prewar yield.

The shortage of storage tanks is a grave hindrance. Only one storage tank with a capacity of 5000 tons (39,000 barrels) was found intact upon liberation, whereas storage capacities totaled 150,000 tons (1,170,000 barrels) before Japanese occupation.

In the oil fields and refineries at Balikpapan, where the prewar annual yield was about 1 million tons (about 7,800,000 barrels), all pipe lines and oil tanks were destroyed, and the field could not be put into early operation. Good progress in restoration activities is reported.

The Seria oil fields in British North Borneo, which had an annual prewar output of 700,000 tons (5 million barrels), and the refinery at Lutong are expected to be working at full capacity in 1947. Meanwhile, export shipments will be started.

Because of the destruction wrought in the Miri oil fields in Sarawak, further investigation is necessary to determine if rehabilitation is financially feasible. Annual prewar production was 200,000 tons (1,330,000 barrels).

British Public Asking For Additional Gasoline

Efforts to force the government into releasing more motor fuel for normal public consumption have been intensified in Britain. The argument advanced by those pressing for more fuel—mainly the opposition in the Commons—is that the limitation of petroleum allocations to the civilian is limiting every aspect of national life. The opposition cites that more petroleum would quicken the tempo of public life. The government's argument against releasing extra supplies of gasoline is largely the same, that such an action would lead to a quickened tempo, but to one which the nation cannot at present afford.

The extra gasoline, the government points out, would be used for pleasure motoring, or for enterprises and activities not vitally essential in national life.

The motor industry and other interests anxious to obtain added allocations of petroleum are pointing to the fact that Continental countries offer unlimited gasoline and more and more British people are going abroad to enjoy the motoring. Thus, they are spending sterling abroad which could be spent to better purpose at home.

Preparations Made for South American Parley

Central organizations of the South American Institute of Petroleum, meeting with national sections of the Institute in Argentina, Bolivia, Brazil, Chile, Ecuador, Peru and Uruguay, are making preparations for the First South American Congress of Petroleum which will convene in Lima, Peru, in March, 1947.

The central office of the Institute is answering numerous inquiries on the work and proceedings of the Congress, and is distributing the constitution and by-laws of the Congress throughout the Americas.

According to the constitution, official members will be the individuals and corporations already enrolled as active members. However, those expressing a particular interest in the Congress and its aims may be invited by the qualifications committee to become members.

The American Petroleum Institute of North America will send an official delegation to Lima to assist the members of SIAP in the preparatory work now in progress.

The detailed agenda of this conference was presented in THE OIL WEEKLY in its March 4, 1946, issue.

First Kuwait Crude Enroute to U.S.

The first commercial shipment of Persian Gulf oil—100,000 barrels of Kuwait crude—ever to reach the United States will arrive this month at the Gulf Refining Company's Philadelphia refinery. This first shipment of Kuwait oil, a sulphur crude of 33 API gravity, will be used for test runs in Gulf's plant and for extensive laboratory study.

Ceremonies at the field loading tanks and docks June 30 marked the loading by Gulf of the first tanker from the Kuwait fields. The shipment went to the Anglo-Iranian Oil Company. The loading rate was reported satisfactory through the longest gravity loading line in the world, six miles from tanks to ship, of which five miles is over land.

The Kuwait production is controlled by Kuwait Oil Company, Ltd., jointly owned by Gulf and Anglo-Iranian. Initial shipments of 30,000 barrels daily are scheduled. Production in excess of 50,000 barrels a day is expected before the close of the year. No further shipments to the United States are yet scheduled.

Socony-Vacuum Is Testing Wildcat Well in Colombia

Socony-Vacuum Oil Company is testing its Yanacue 1, in the Magdalena Valley area of Colombia. The test, located southwest of the Cantagallo field and one the same concession with the production, bottoms at 5210 feet. Just where the initial test will be made was not announced.

Meantime, Socony-Vacuum has nine other rigs active in Colombia and Venezuela.

The Pedral 1, wildcat located across the river east of the Cantagallo field, Colombia, is still delayed with a bad fishing job at 9310 feet. The La Salina 1, wildcat on the Las Monas concession, east of Cantagallo, was drilling below 2888 feet at last report. The company also is drilling single tests in the Cantagallo and Sinu fields.

Three field tests are drilling in the Oficina area of Venezuela, while two tests are active in the Barinas field of Venezuela.

Texas Petroleum's Well In Colombia at 7923 Feet

The Texas Petroleum Company's Velasquez 1, wildcat test being drilled on the company's Teran-Guaguaqui freehold in the Department of Boyaca, Upper Magdalena Valley region, Colombia, is drilling ahead below 7923 feet.

This test, which has apparently assured the opening of a new oil field through shows on drill-stem tests, likely will be carried to 9000 feet unless it hits basement rock. Reports say that the operator is beginning to pick up some water shows in stringers of sand.

A drill-stem test at 7254-74 feet recovered 15 stands of light, 35-gravity oil in 13 minutes. Two other tests at higher levels also showed oil on tests. Reports say that one section of 350 feet contained about 162 feet of net oil sand.

Mexico Northern Fields Gain

Petroleum production in Mexico's three northern oil fields of Poza Rica, Naranjos, and Panuco increased sharply during the month of April, amounting to 3,945,176 barrels, as against 3,445,021 barrels in March. The daily average for April was 131,505 barrels, an increase of 18 percent over the March average and 34 percent above the average for January, 1946.

Creole's Daily Production In Venezuela Increases

Creole Petroleum Company's oil production during the month of May in Venezuela field averaged 554,513 barrels daily, a sharp increase over the daily average of 458,618 barrels in May, 1945.

The daily average output of the Lake Maracaibo area during May, 1946, was 400,629 barrels as compared with the daily average of 317,603 barrels in May, 1945. In the eastern and other areas, including Cumarebo, the daily average output in May, 1946, was 153,884 barrels as against 141,015 barrels daily during May of last year.

TGT Expansion Authorized

The Tennessee Gas and Transmission Company has been granted authority by the Federal Power Commission for an estimated $31 million worth of additions to its natural gas pipe line system. Following installation of the additions the company will be purchasing daily in excess of 100 million cubic feet of waste gas now being flared in South Texas oil fields.

The projects include construction of a 95-mile extension of its line to the San Salvador field in the Rio Grande Valley, and increasing the capacity of its main line by approximately 40 percent, of which three-fourths will be supplied by gas formerly wasted.

TGT has negotiated for the purchase of 87 million cubic feet daily of gas now being wasted in the Seeligson, Tom O'Connor, Heyser, and Katy fields.

To handle the increased load TGT has been given permission to build 3 new compressor stations, add 20,000 horsepower to existing compressor stations, and lay 400 miles of 26-inch loops and 10 miles of 24-inch loops on its main line. The new stations will be near Victoria and Cleveland, Texas, and at Natchitoches, La.

The 16-inch extension to the San Salvador field will have a capacity of 96 million cubic feet daily.

West Texas Oil Products Line Slated by Cosden

Cosden Petroleum Corporation, owner of a 17,000-barrel capacity refinery at Big Spring, Texas, has completed preliminary survey for the construction of a 225-mile, 4-inch products line to extend east to Weatherford, with distribution terminals at all important intermediate points.

The complete project will not be undertaken immediately, and the first unit will consist of 65 miles of line to Sweetwater, or 90 miles of the line to Abilene.

Shell Taking Wasson Oil

Shell Pipe Line Corporation resumed taking the full allowable of its connections in the Wasson field, West Texas, on July 1 after curtailing runs to 87 percent of the allowable during June due to inability to transport or store the high allowable given the field. The field's production quota was reduced from 75,000 to 66,964 barrels daily by the Rail Commission on July 1, while in the meantime Shell diverted additional excess runs to other lines.

New Seeligson Extension

Humble Pipe Line Company is starting construction of an 18-mile 6-inch pipe line extension from its Seeligson field, Southwest Texas. terminal to the Canales field. This line will handle Humble Oil & Refining Company's controlled and purchased crude that has been routed through the Sun Pipe Line Company's carrier. The latter is operating at capacity, and requires more space for its own movement.

Pipe Line Map Correction

The gas lines leading from northwest and southwest Wyoming and northeast Utah into the Salt Lake Valley of Utah belong to the Mountain Fuel Supply system, and not to Northern Utilities Pipe Lines as shown on THE OIL WEEKLY's pipe line map inserted in the issue of June 24.

Permit Is Granted for West Edmond Field Line

Authority to begin construction by August 1 of a 64.5-mile, 12-inch natural gas pipe line from the four-county West Edmond field of Oklahoma to the Drumright compressor station of Cities Service Oil Company has been granted by the Federal Power Commission. Completion of the line is expected by November.

S. B. Irelan, president of the company, said that permit also was granted for the construction of a 6.5-mile, 16-inch line from the company's Craig storage field to the Glavin station in Johnson County, Kansas. Work on this line will begin in August.

When the line at West Edmond is completed, it will increase the capacity of facilities for taking Edmond area gas to an estimated 60½ million cubic feet daily, or an increase of more than 27½ million feet over the amount now being purchased by the company there.

With the two new lines Cities Service will have available for markets on its system about 50 million cubic feet of additional gas for anticipated peak demands during 1946-47.

Humble Products Line

Construction is progressing rapidly on both sections of Humble Pipe Line Company's new 276-mile, 8-inch products line from Baytown to Dallas. About 92 miles of the line has been completed on the Hearne-Dallas section, and 65 miles on the Baytown-Hearne section.

Built of all new steel pipe, the line will cost about $4 million. As planned, it will have a delivery rate of about 15,000 barrels daily of gasoline and other products.

Pipe Line Firm Formed

The Southern Sohio Pipe Line Company, Inc., has been organized by the Sohio Petroleum Company to operate the 37-mile 8-inch crude line under construction from the Tinsley field, Mississippi, to barge terminal on the Mississippi at Mayersville.

Third Pipe Line Planned For California Gas Field

Southern California Gas Company is planning to lay a third pipe line into the Trico gas field in Kern County, California, this fall. The additional line, which will be either 8- or 10-inch, is needed to transport gas from the recently developed northern part of the field. Two 8-inch lines now tap the southern part of the field. A considerable supply of gas has recently been developed in the northern part and additional drilling is contemplated.

The Trico lines empty into the 16-inch carrier that picks up gas from the Buttonwillow field about 18 miles to the south.

Quitman Carrier Taken Over by Pan American

Pan American Pipe Line Company has taken possession and is now operating the Central Pipe Line Company's trunk line from the Quitman field, Wood County, Texas, to the East Texas field and the gathering system in the Quitman field.

The purchase of this trunk line, composed of about 45 miles of 4, 5 and 6-inch line, and about 20 miles of gathering lines, was made by Pan American early in June. Pan American Production Company became a purchaser in the Quitman field on July 1.

Work Started on Surveys For California Gas Line

Southern California Gas Company and Southern Counties Gas Company have started right-of-way surveys and are working on other preliminaries incidental to the construction of their section of the West Texas-California natural gas line.

The California firms will lay 214 miles of 26-inch line from Santa Fe Springs to Blythe, California, where it will connect with the gas carrier to be constructed by El Paso Natural Gas Company from West Texas.

Unless delayed by pipe deliveries, the entire line will be ready for service during the winter of 1947-48.

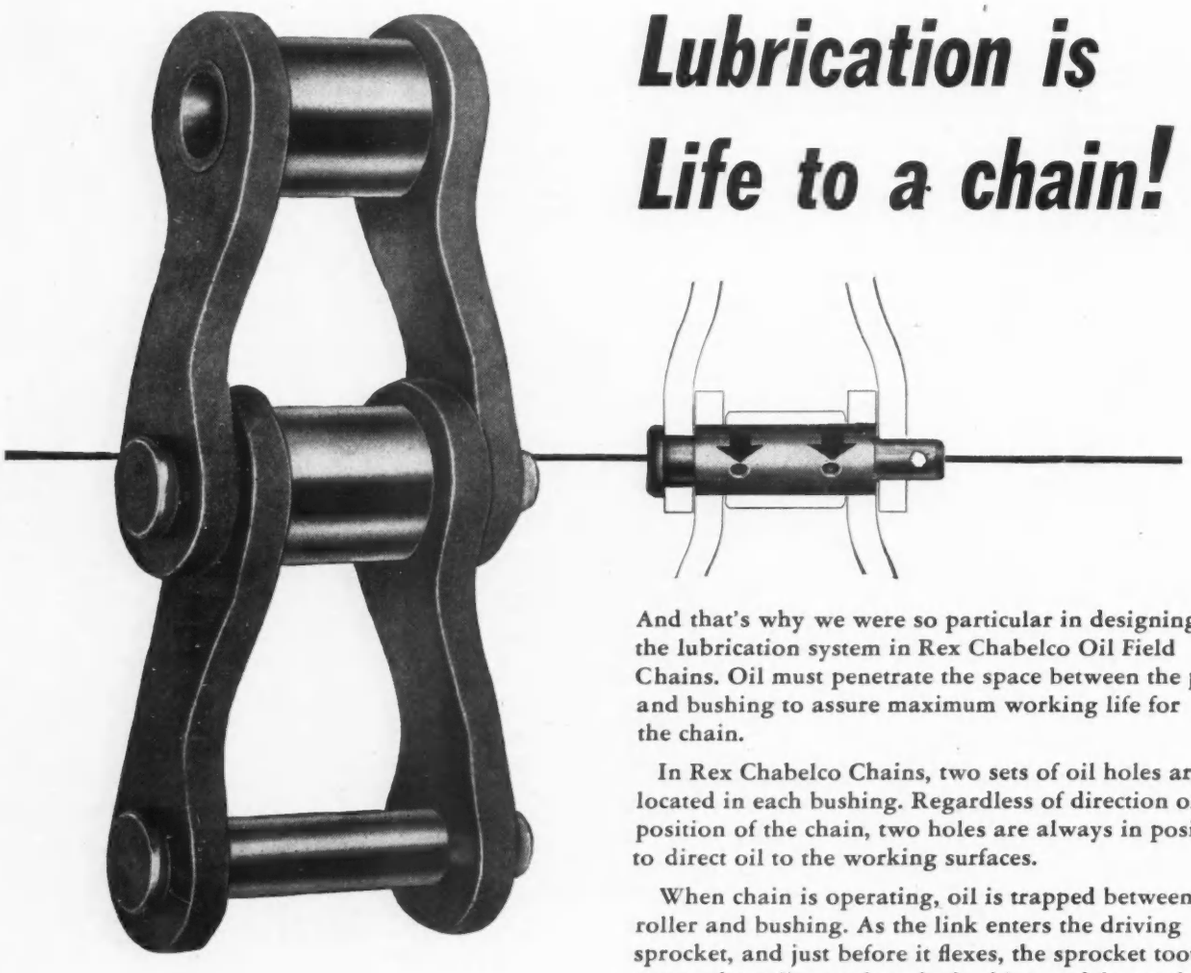
Rings the Bell

Typical of the comment received following publication of The OIL WEEKLY's pipe line map (inserted in the June 24 issue) is this letter from Edgar A. Waite, manager of the public relations department, Standard Oil Company of California, San Francisco.

"We received today the latest issue of The OIL WEEKLY in which we found enclosed a map of the pipe lines of the United States. *Congratulations on such a complete and up-to-date job!*

"We are very anxious to add this material to our reference files and would appreciate it if you would send us ten more copies of the map."

Lubrication is Life to a chain!



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When chain is operating, oil is trapped between the roller and bushing. As the link enters the driving sprocket, and just before it flexes, the sprocket tooth moves the roller against the bushing and forces the oil through the bushing holes. In effect, you get force-feed lubrication of the chain joint. This built-in lubrication system assures longer chain life and prevents premature breakdowns.

Rex Oil Field Chains are the answer to every oil field service. There is a type and size to fit your needs. For information, see your Rex Field Engineer, your local supply store, or write us direct.

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Improved Muds Contain Carboxymethylcellulose

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MODERN practice in the rotary method of drilling well bores is generally considered to date from the use of rotary tools in the Spindletop field in Texas in 1901. Rotary drilling is a method primarily dependent upon a practical means by continuously removing cuttings from the well bore as drilling proceeds. This is accomplished by circulating a fluid through the drill-stem and bore-hole annulus. Any fluid might be used for the purpose that under flow conditions existing in the circulating system has the capacity for suspending and carrying earth cuttings to the surface. Water was first used, and is the fluid most generally employed. Oil has been employed on special occasions in recent years, and, in some instances, gas has served the purpose.

It would require no involved study to determine how it was that water used as the circulating fluid became known to the industry as "drilling mud." Any liquid, and particularly water, on being circulated in contact with the bore-hole cuttings would soon become an admixture with finely divided insoluble minerals in suspension, and, with some quantity of soluble minerals in solution. Such a mixture of earth and water would do to the ordinary being have the appearance of "mud," even though the name, as drilling mud is known today, is perhaps not the best choice of nomenclature. It is interesting to observe, however, that drillings muds were first unavoidable dispersions of both insoluble and soluble earth minerals in water. Such a mud resembled a modern drilling mud only in the general respect of being a dispersion of both soluble and insoluble materials in the circulating fluid. In present times, one of the important problems in the maintenance of drilling muds is to maintain control of the properties of the mud under the destructive effect of the unavoidable additions to the mud encountered while drilling.

Back-Pressure Control

It would appear that the industry soon recognized that drilling mud served many functions other than that of simply removing cuttings as drilling proceeded. The function of mud as a means of back-pressure control must have been very early recognized.

The necessity for back-pressure control led to the addition of finely divided heavy-mineral substances for the purpose of increasing the specific gravity of the mud. The most practical choice of such a weighting material led to the universal use of the mineral barite. Addition of weighting material was, perhaps, the first step in the art of "synthesizing" drilling mud. It was a significant departure from the practice of relying solely on a circulating fluid whose properties were dependent upon the admixture resulting from the minerals unavoidably encountered in the course of drilling. The problem of maintaining a suspension of weighting material in the circulating fluid led, after trial and error, to the almost universal use of bentonitic clays as a mud additive. These minerals were added in quantities over and above the amount that might have been unavoidably encountered for the reason that they possessed "gel-like" characteristics in water and were found to stabilize the suspension of weighting material in water. At the same time, the art of using other types of clays to improve filter cake and viscosity characteristics must have been started. By 1930, synthetic drilling muds took the form of "water-weighting material—bentonites, clays, stabilizing chemicals." Non-aqueous drilling muds, using oil as the dispersion medium in place of water, have been introduced but as yet have only special applications.

Many papers have been presented in the trade and technical journals on the subject of drilling muds. Yet, it cannot be said that the literature on the subject provides a complete knowledge of the drilling mud art. A substantial amount of research remains to be done, particularly if broad scientific principles are to be established as a guide in the synthesis and control of drilling muds. The principal objective of mud research is to seek improvements for the purpose of reducing well drilling costs. Drilling costs involve a direct expense of the mud itself. Cost enters in a more important way, however, as an indirect cost of drilling. A "good" drill-

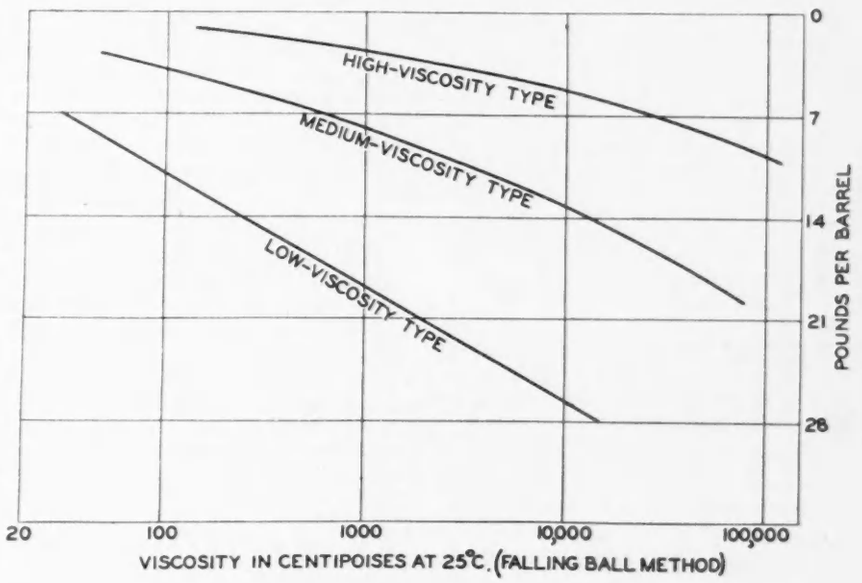


Figure 1. Cellulose Concentration in Distilled Water.

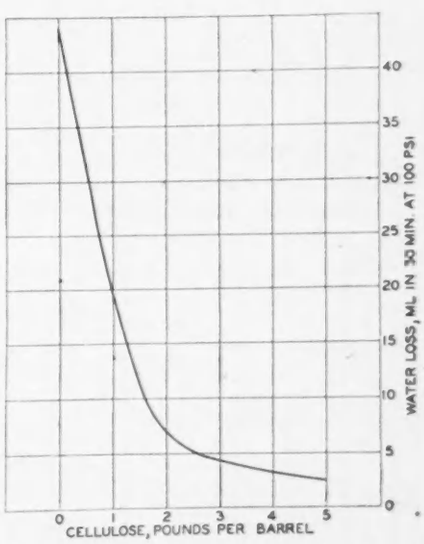


Figure 2. Water loss behavior as function of cellulose content.

* Presented at the spring meeting of the Mid-Continent District API Division of Production, Oklahoma City, June, 1946.)

ing mud permits substantial savings in drilling time and well completion. The indirect cost savings amount to sums large enough to justify increased investment in the formulation, control, and handling of "good" drilling mud if such a mud can be compounded.

Colloid Chemistry and Mud Technology

Drilling muds are colloidal systems. In recent years, the literature on the subject has stressed this fact in attempts to develop a technology of drilling muds. In some respects, the "colloidal" viewpoint has been over-stressed. The average technologist required to use and control drilling muds has found little guidance from the purported scientific explanations of what occurs from a physical and chemical point of view when barite, bentonite, clay, and other chemicals are mutually dispersed in water. The chemistry and physics involved lie in a field generally foreign to the interest, training, and experience of the average petroleum technologist. To even the more scientifically informed, drilling mud practices still remain an art rather than a technology derived from a well-defined field of science. Drilling mud improvement is still mainly a trial and error compounding. The field of colloidal chemistry provides only very broad rules for guidance.

The science of colloidal chemistry which has been disappointing in its failure to permit many immediately useful conclusions from the large and extended effort that has been made in that field.

The few broad principles that may be stated with some certainty in respect to systems represented by the dispersions of soluble and insoluble minerals comprising synthetic drilling muds may be summarized in the following statements. Drilling muds are suspensions of solids in aqueous solutions, and, like all colloidal dispersions, have a limited life. Such dispersions tend to separate into concentrated masses of their respective phases. The rate of separation (the life of the colloidal system) is determined by the particle size, the difference in specific gravity of the dispersed phase and the dispersion medium, and the viscosity of the dispersion medium in conformance with fairly well established laws. The rate of separation is also determined in some measure by the chemical composition of the system. It is well known that drilling muds, like other such types of dispersions, have a short life in the presence of high concentrations of soluble electrolytes. Their sensitivity to electrolytes varies in an approximate relationship with the valency of the offending ion. It is also true that certain substances tend to impart prolonged life or stability. Bentonite stabilizes dispersions of barite and water if dissolved salt concentrations are low. Certain organic colloidal materials in the class of water dispersible starches and natural gums have been used or recommended as additives to stabilize mud dispersions in the presence of soluble salts.

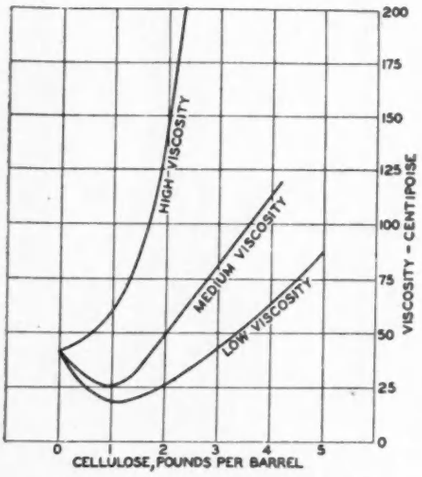


Figure 3. Viscosity of drilling mud with different amounts and types of cellulose.

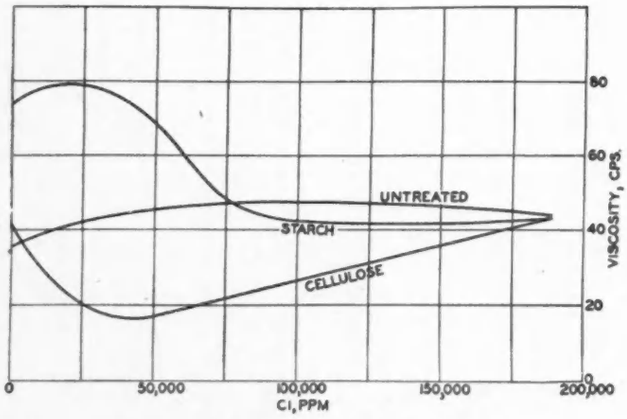


Figure 4. Effect of salt on viscosity of mud.

Colloidal chemistry fails to be an effective guide in the control of drilling muds, perhaps because it is the chemistry of complex systems. The chemistry of pure substances can be expressed by useful rules and principles. But, the chemistry of systems comprised of a wide variety of components substantially different in their pure chemical behavior, involves a complexity of reaction that lies beyond the realm of well-organized, intelligent knowledge. Certainly, this statement applies to drilling muds so long as practical considerations of cost preclude an unlimited choice as to the composition of a circulating medium.

A "good drilling mud should have

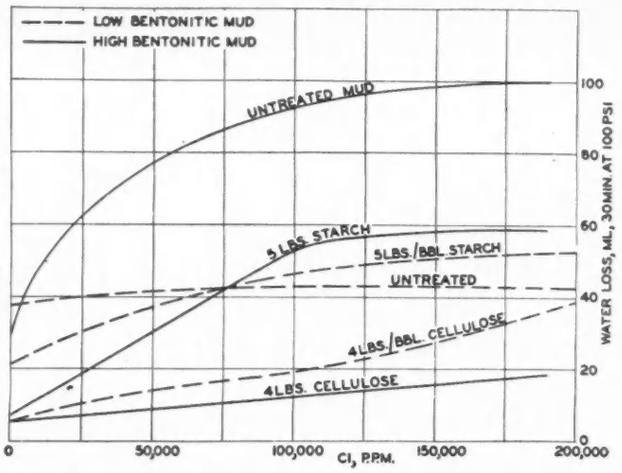


Figure 5. Effect of salt on water loss values.

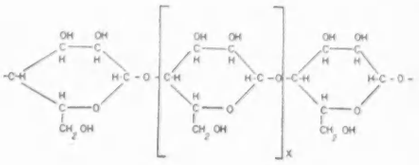
the following properties:

1. Low viscosity compatible with pumpability and carrying capacity for cuttings.
2. Stability of the suspension of the weighting material, particularly in muds weighing more than 12 pounds per gallon.
3. A high degree of thixotropy.
4. A thin, tough, filter cake of low permeability and of good deplastering quality.
5. Temperature stability.
6. High resistance to electrolytes.
7. Responsive to treating agents and control of properties.
8. Low electrical resistance.
9. Capacity to release larger size cuttings and release gas in the mud pit.
10. Non-destructible by chemical or bacterial action.
11. Retards swelling of "bentonitic" or "heaving" shale.
12. Low initial and low maintenance cost.

Such a list of criteria for a "good" drilling mud is impressive by the fact that a drilling mud must meet a wide range and variety of uses and functions. Many materials and combinations of substances have been suggested as circulating fluids in rotary drilling operations.

In view of the practical and economic limitations on the choice of compounds for drilling mud, researches were undertaken to seek improvement in the conventional aqueous drilling mud system. These researches led to the discovery that certain derivatives of cellulose, known as alkali metal carboxymethylcellulose, when added to the conventional aqueous drilling mud caused substantial improvement in all desirable characteristics. Mud containing alkali metal carboxymethylcellulose showed superior properties to any heretofore used. The sodium salt is the cheapest alkali metal salt, and, for that reason, it is the salt of carboxymethylcellulose which will be used commercially.

Cellulose is the main and principal constituent of the woody parts of plants. The chemical structure of cellulose may be represented by the following formula:



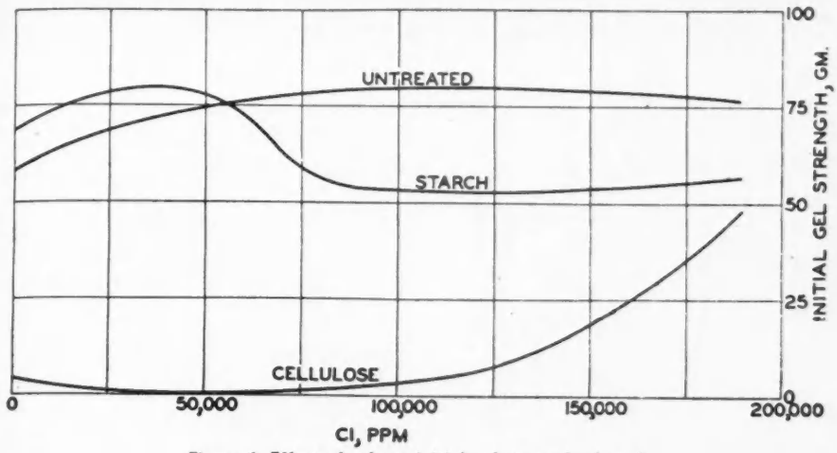
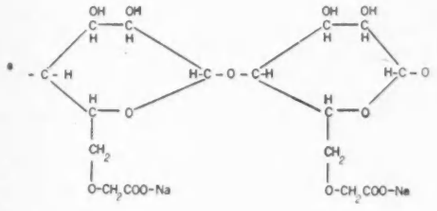


Figure 6. Effect of salt on initial gel strength of mud.

It is a very large molecule. The glucose unit indicated by the sub-script "X" in the formula recurs more than 200 times in the molecule.

Cellulose is insoluble in water. It is, however, soluble in alkali, such as a 40 percent aqueous solution of sodium hydroxide. In alkaline solution, the cellulose molecule is split into smaller units. The degree of splitting depends upon temperature, time, concentration of oxygen, and, concentration of caustic. The splitting reaction is the first step in rendering cellulose suitable for use in the drilling mud. If the sodium cellulose formed by solution in caustic soda is treated with mono-chloracetic acid ($ClCH_2COOH$), a substitution occurs first on the primary hydroxyl group, and, if the reaction is allowed to proceed further, next upon the secondary hydroxyl groups, in such a manner as to yield a glycollic ether. When only the primary hydroxyl groups are reacted, the product carboxymethylcellulose is as follows:



This is the second step required to render cellulose suitable for use in drilling mud. The compound in this example is sodium carboxymethylcellulose. It is a white, granular, odorless, and tasteless powder having a specific gravity of 1.7.

The maximum substitution possible is three hydroxyl groups per glucose unit. If the substitution of the type shown is as much as 0.4, the sodium carboxymethylcellulose is water dispersible.

Water Dispersible Cellulose

The free glycollic acid is insoluble in water but is soluble in alkaline solution. The alkali metal salt is the preferred form for use in drilling mud because it is readily dispersible in water. A point of interest in this connection is that the alkali metal salt of carboxymethylcellulose is an electrolyte, whose anion is large enough to fall within the colloidal classification of size.

One of the outstanding characteristics of alkali metal carboxymethylcellulose is their power to impart high viscosity to aqueous solutions. The degree of viscosity imparted to water solution depends upon molecular size as determined by the degree of splitting in the mercerization reaction, as well as upon the degree of substitution. For commercial application, such compounds can be prepared in a wide range of viscosity characteristics usually referred to as high, medium, and low range. The viscosity behavior in water is summarized by the data given in Figure 1 for the three ranges of viscosity type of sodium carboxymethylcellulose.

Another outstanding characteristic of alkali metal carboxymethylcelluloses is that they possess heat stability in aqueous solutions. Moreover, the viscosity of aqueous solutions show only a very slight reduction with temperatures as high as 212° F.

Alkali metal carboxymethylcelluloses are immune to bacterial or enzymatic action. They do not ferment under conditions of use in drilling muds. Mold growth occurs only under very special and controlled conditions.

Alkali metal carboxymethylcelluloses are not precipitated by salts in solution except for those salts that may be classified as the polyvalent amphoteric type, in the class of aluminum, lead, iron, tin, and copper. Of particular interest is the fact that calcium ion does not precipitate carboxymethylcellulose except from solutions nearly saturated with a calcium salt such as calcium chloride. This is important in connection with drilling muds in view of the resistance to anhydrite and cement contamination that the alkali metal carboxymethylcellulose imparts.

Cellulose derivatives of the type being discussed, have been known for at least 25 years. They were industrial products in Germany during World War I. They have found a wide variety of uses ranging from application in the manufacture of crayon through a long list to include even the baking industry. No application of the material, however, is more interesting, nor more important, than that which resulted from the discovery of the pronounced beneficial effect of the cellulose derivatives in drilling mud. Perhaps no useful application of the material was more unexpected.

Properties of Muds Containing Carboxymethylcellulose

Researches involving a detailed laboratory appraisal have been completed and a number of wells have been drilled using sodium carboxymethylcellulose as a drilling mud additive. Experience and technical data developed to date indicate that sodium carboxymethylcellulose imparts superior characteristics to aqueous drilling muds. Its use has permitted a substantial reduction in direct mud

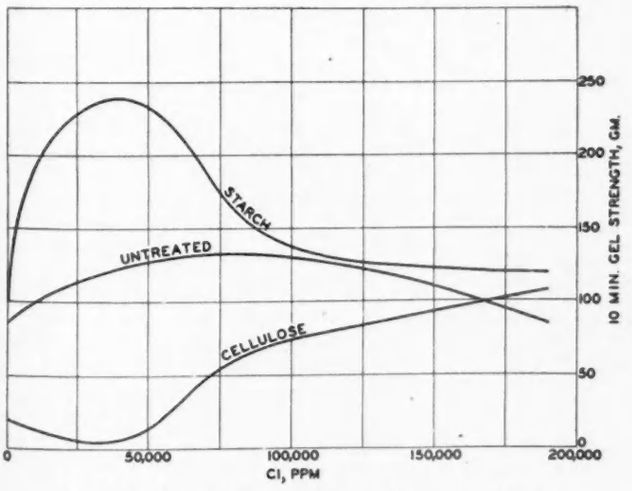


Figure 7. Effect of salt on 10 min. gel strength of mud.

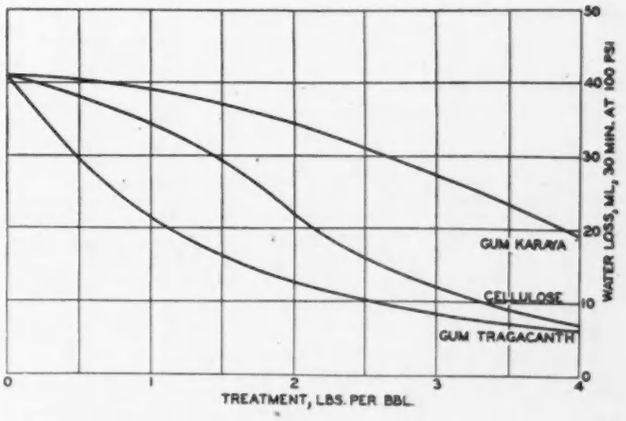


Figure 8. Comparison of effects of cellulose with natural gums.

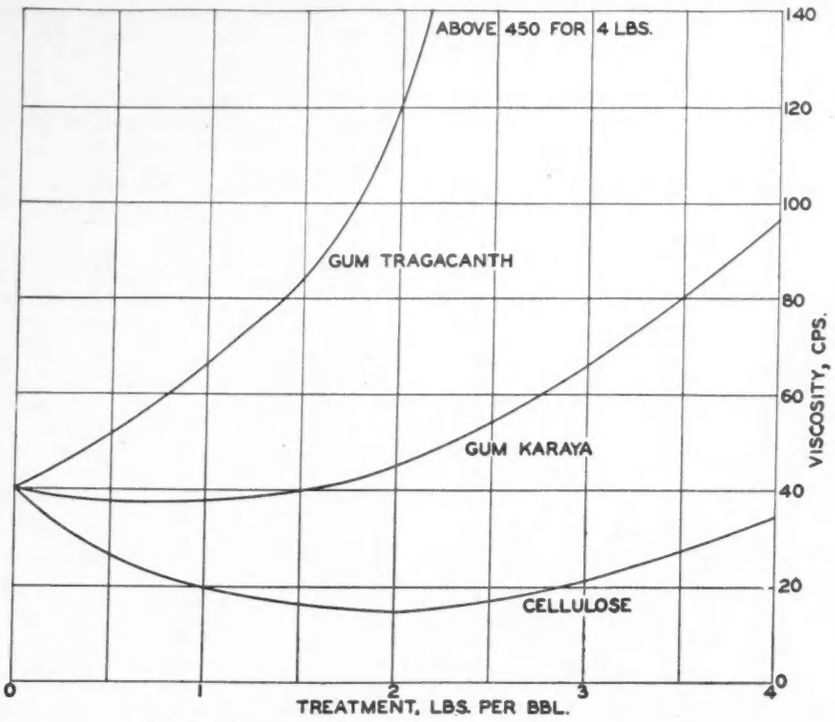


Figure 9. Comparison of effects of cellulose with natural gums.

costs. Beyond this, the good mud characteristics, and ease of mud control when it is used, has permitted substantial indirect savings in drilling and completion costs.

The general properties of the sodium carboxymethylcellulose mud are summarized as follows with the information presented based entirely upon the generally accepted test procedures of API Code 29:

1. Water loss. Sodium carboxymethylcellulose imparts to all varieties of aqueous drilling muds a low water loss in the standard filter press test. Standard water losses in the range of 3 to 4 cubic centimeters per 30 minutes can be obtained and maintained. The general result obtained in respect to this property is shown by Figure 2. Low water loss values can be maintained in the presence of high concentrations of soluble salts.

2. Filter cake thickness. Filter cake characteristics of drilling mud with sodium carboxymethylcellulose are consistently in the range of 2/64-inch to 3/64-inch thickness.

3. Viscosity. In spite of the marked effect of sodium carboxymethylcellulose in increasing the viscosity of water, it was surprising to discover that in drilling muds the viscosity increase of sodium carboxymethylcellulose is not excessive. In many instances, the viscosity of the mud is reduced. The viscosity resulting from the use of sodium carboxymethylcellulose depends somewhat upon the quantity of bentonites and non-bentonitic type clays present. The general behavior is represented by Figure 3.

Viscosity control in useful operating ranges can be maintained in the presence of sodium carboxymethylcellulose, even when salt content is high. The general behavior in this respect is shown in part by Figure 4.

4. Gel strength. Low gel strengths can be consistently obtained and maintained in drilling mud by the use of sodium carboxymethylcellulose. In any event, the thixotropic ratio, measured as the ratio of the ten-minute gel strength to the initial gel strength, is usually increased by the use of sodium carboxymethylcellulose. This is a very desirable condition. Gel strengths, however, depend upon the quantity and type of clay present. High bentonitic content muds show less decrease in gel strength than do those having high non-bentonitic type clay content. It is, howevr, quite possible to maintain initial gel strengths in the range of 0 to five grams by the standard Stormer test, and ten-minute gel strengths in the range 20 to 40 grams, for any mud if salt concentrations are less than 75,000 parts per million.

5. Resistance to salt flocculation. Sodium carboxymethylcellulose has a remarkable ability to stabilize drilling muds in the presence of even high concentrations of soluble salt. This is particularly true in the case of sodium chloride and calcium salts, commonly encountered in the drilling operation. In this respect, sodium carboxymethylcellulose renders the mud truly salt water resistant. In the presence of soluble salt, low water loss can be maintained while viscosity and gel strengths can be readily maintained in acceptable and useful ranges. The effectiveness of sodium carboxymethylcellulose in respect to its salt resistance is shown by the information given in Figures 4, 5, 6 and 7, respectively, wherein salt was added to the salt-free mud. Resistance to salt concentrations in respect to all properties is improved if salt is added or is present in the drilling mud before the sodium carboxymethylcellulose is added.

Experience indicates that salt and anhydrite sections can be drilled without the treating problem encountered with either conventional or starch base muds. Conditions may be encountered where some treatment would have to be given for the presence of soluble calcium ion to reduce viscosity of the mud. If that is required, the conventional methods for removing calcium can be relied upon.

Comparison with Starch and Gum

In recent years, water dispersible starch has been widely used as a drilling mud additive for the particular purpose of maintaining mud properties in the presence of high salt concentrations in the mud. Natural gums have been suggested as additives for mud for the same purpose. A summary of comparative tests of starches and gums as compared to sodium carboxymethylcellulose is given in Figures 4, 5, 6, and 7, for starch, and, in Figures 8 and 9 for natural gums, indicating that sodium carboxymethylcellulose possesses superior properties to either starch or gum in the compounding of salt resistant drilling muds. Sodium carboxymethylcellulose has many distinct advantages over both starches and gums beyond maintaining superior mud properties in the presence of high salt content. Sodium carboxymethylcellulose is not fermentable and is not subject to enzyme action. Sodium carboxymethylcellulose does not require maintenance of high pH since its range of usefulness lies at any point above 7.5. Sodium carboxymethylcellulose muds are stable at all temperatures encountered in drilling. Natural gums deteriorate too rapidly and give such high viscosities in mud as to cause them to be not very useful.

Sodium carboxymethylcellulose is different in chemical structure from starch or gums, and, the comparison made here with starch and gums is given merely for the purpose of comparing its properties in drilling muds with those of starches and gums.

Heaving Shale

Laboratory tests have demonstrated that bentonite and bentonitic minerals show little tendency to swell in contact with water dispersions of sodium carboxymethylcellulose. In fact, if moderate quantities of salt are present in solution with carboxymethylcellulose, the tendency to swell in contact with water that bentonite possesses is almost completely repressed. At the present time, a program of well drilling in areas underlain by thick shale sections is going forward. In due course, field experience will be had to determine whether or not the sodium carboxymethylcellulose mud will be effective in overcoming the difficulties of drilling in "heaving shale."

Summary of Well Drilling Experience

Considerable experience in well drilling in areas underlain by either or both salt and anhydrite sections has been obtained. Such experience shows clearly that sodium carboxymethylcellulose muds permit substantial savings in direct mud cost and result in savings in drilling time.

In Figure 10, experience in drilling wells in the Hugoton gas field is summarized. Weighting material is not added to the drilling mud in these operations. These wells were all drilled in immediately adjacent areas under drilling conditions that otherwise appeared to be quite comparable. The

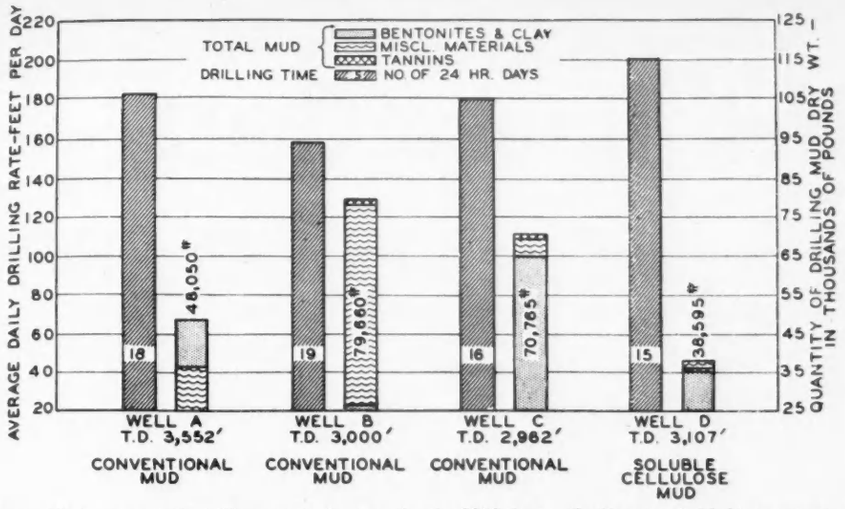


Figure 10. Average daily drilling rate in feet per day for 3000-foot wells, Hugoton field, (Approximate top of massive anhydrite section, 2100 feet).

well drilled with sodium carboxymethylcellulose mud showed as high a rate of drilling and required substantially less quantity of drilling mud materials than other wells drilled with conventional mud. The conventional muds were subjected to various types of treatment and composition in an effort to improve and maintain good quality. The sodium carboxymethylcellulose mud requiring little if any treatment was in all respects superior to conventional muds used. The short drilling time required for these 3000-foot wells does not permit definite conclusions as to whether or not the sodium carboxymethylcellulose mud actually resulted in any significant decrease in time of drilling. The salt section penetrated in these wells is approximately 800 feet thick in the interval 2000 to 2800 feet in depth (Well D).

South Tyler Experience

In Figure 11, a summarized experience in drilling 10,000-foot wells in the South Tyler field, Smith County, Texas, is given where two wells were drilled with conventional mud, two with starch-base mud, and one with sodium carboxymethylcellulose mud. The "weight of mud used" is exclusive of the weights of barite for the purpose of showing the quantities of clay and treating chemical required. The weighting material required for all wells was approximately the same. In the South Tyler field, anhydrite stringers are encountered in the interval 8900 to 9100 feet, while a 250-foot anhydrite section occurs in the interval of approximately 9300 to 9550 feet. The usual practice is to carry 13½-pound mud to approximately 9400 feet, and 14½-pound mud to total depth. Sodium carboxymethylcellulose mud was used from a depth of 6000 feet after surface pipe was set. The average characteristics of the sodium carboxymethylcellulose mud, other than the weight just given, that were maintained below 6000 feet were: water loss, 5 cubic centimeters per 30 minutes pH: 8.0; 10-minute gel-strength: 40 grams; initial gel-strength: 0 to 10 grams; and viscosity 65 centipoise.

Advantages in the use of sodium carboxymethylcellulose mud are reflected by the substantially lower requirements for treating chemicals. The actual drilling time for the sodium carboxymethylcellulose mud compares favorably with the best rate of drilling achieved with any other type mud.

Other advantages of the sodium carboxymethylcellulose mud observed during the course of well drilling may be referred to briefly: low initial gel-strengths obtainable cause the muds to readily release entrained gas, and, to drop cuttings in the mud pit rapidly. The mud responds readily to treating agents and is, therefore, not subject to overtreatment with resultant detrimental effects. The sodium carboxymethylcellulose mud shows an unusual ability to carry weighting material when weights in the range of 13 to 15 pounds per gallon are necessary.

Method of Handling Sodium Carboxymethylcellulose

The use of sodium carboxymethylcellulose in drilling mud involves no special procedures nor special equipment. The material is a non-hygroscopic solid that can be shipped in paper bags, stored and handled in the same manner as other mud components. The material goes into solution readily, but should be introduced with thorough stirring. This is most conveniently accomplished by using a vacuum type hopper to introduce the material into the mud stream at a uniform rate. The sodium carboxymethylcellulose operates most efficiently in the presence of some salt concentration in the general range of 20 to 30 thousand parts per million of salt. If the sodium carboxymethylcellulose is used to counteract additions of salt or anhydrite to the mud, the best practice is to add the sodium carboxymethylcellulose before such additions occur. The quantity of sodium carboxymethylcellulose required varies with existing conditions and lies in the range of one pound to four pounds per barrel. The usual quantity is two to three pounds per barrel.

The present supply of sodium carboxymethylcellulose for use in drilling mud is quite limited, but it may be expected that some quantity of material will be available in the last quarter of 1946. It is expected that a supply sufficient to meet the demands of the industry will be available in 1947.

Summary

Field and laboratory experience has established that alkali metal carboxymethylcellulose impart superior qualities to aqueous well drilling mud comprising the system: water plus dispersed fine mineral solids. Improvement in all of the desirable properties of such muds, more particularly in water loss, filter cake thickness, gel-strength, viscosity, salt water resistance, and freedom from fermentation, is obtained. Cellulose is an economical material to use in drilling muds and its use results in substantial savings in direct mud costs, as well as savings in drilling and completion costs. This is particularly true of drilling in areas underlain by salt and anhydrite sections.

Acknowledgment

This report is a joint effort on the part of many on the staff of Phillips Petroleum Company. C. R. Wagner was responsible for outlining the original research program. Members of the Drilling Mud Section of the Drilling Tool Division and of the Production Research Section of Phillips Petroleum Company contributed to the research and development of the sodium carboxymethylcellulose mud.

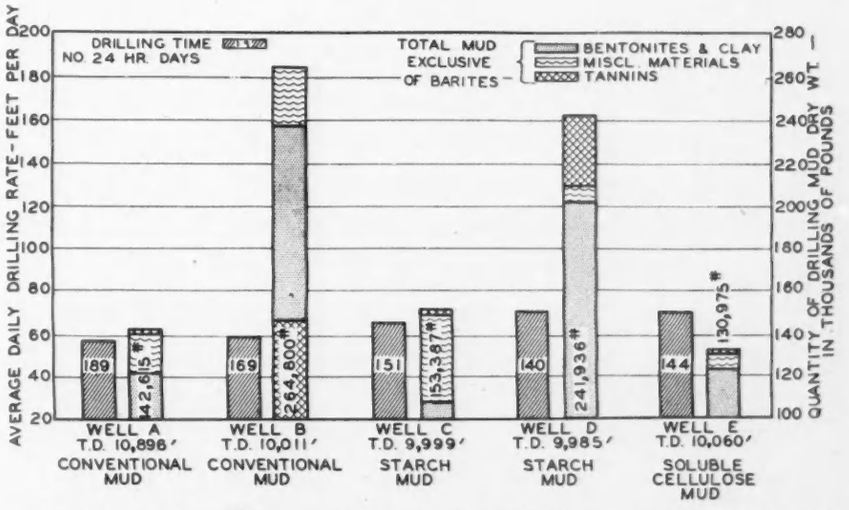
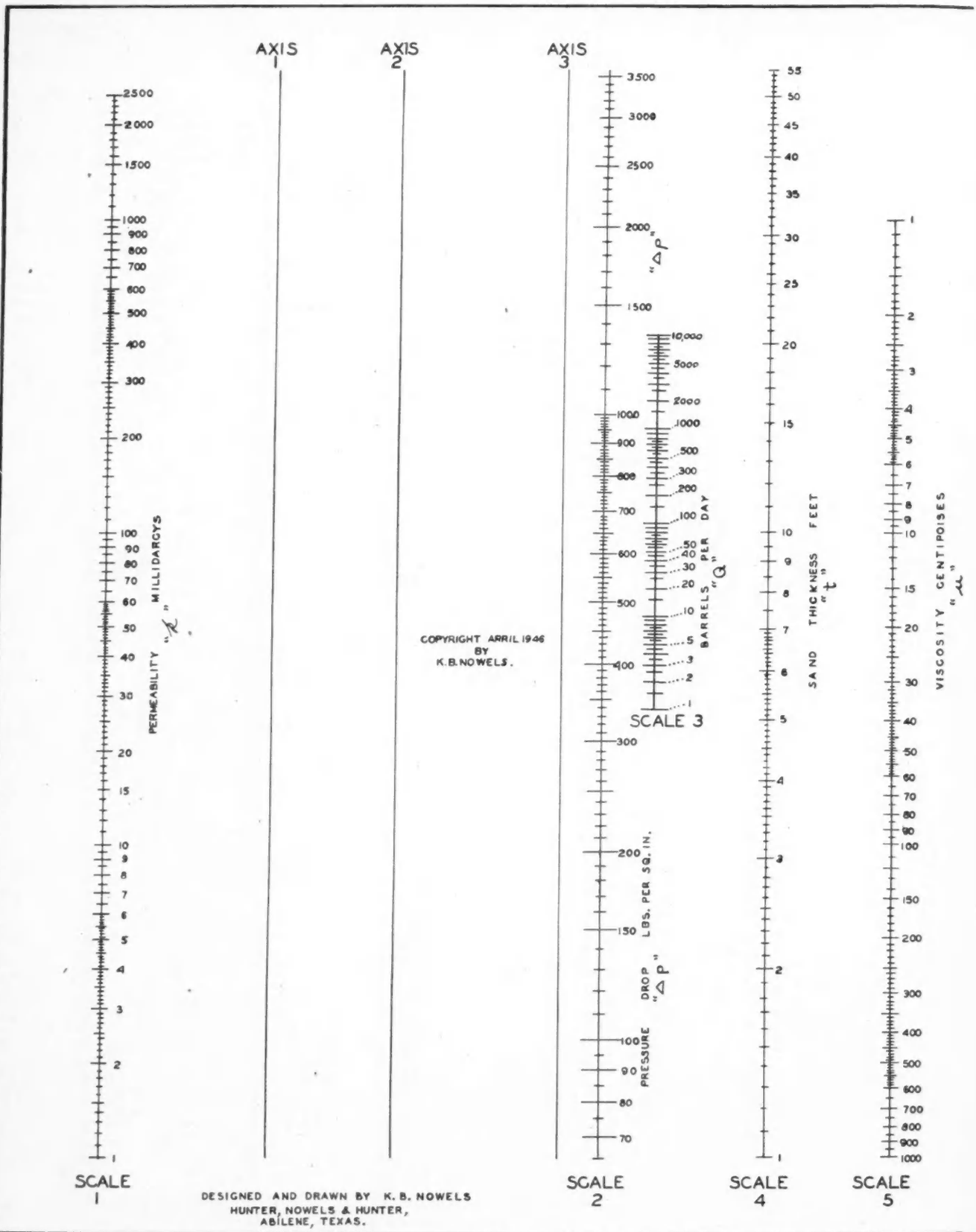


Figure 11. Average daily drilling rate in feet per day for 10,000-foot wells, South Tyler field. (Approximate top of massive anhydrite section, 9300 feet.)

Water Well Intake Chart →



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SEVERAL years ago Muskat and Wycoff devised an equation which expresses mathematically the relation between the intake (or production) rate of a single well in a water flood five spot and the characteristics of the fluids, sand, well, reservoir and pressures. This equation is expressed as follows, and is based upon Darcy's law governing fluid flow through a porous medium:

$$Q = \frac{2\pi kh(p_e - p_w)}{u \log_e \frac{r_e}{r_w}}$$

Where: Q = rate of intake or production, milliliters per second
k = effective permeability, darcys
p_e = pressure in reservoir, atmospheres
p_w = pressure at sand face of well, atmospheres
h = sand thickness, centimeters
u = viscosity of liquid, centipoises
$\log_e$ = natural logarithm, base "e"
r_e = distance from well to point where pressure is p_e, centimeters
r_w = effective radius of well, centimeters

An adaptation of the above formula as used by Muskat, employing the use of ordinary oil field units of measurement is expressed as follows:

$$Q = \frac{(.00154)\ (k)\ (\Delta p)\ (t)}{u\left[\log_{10}\frac{(D)}{(r_w)} - 0.269\right]}$$

Where: Q = fluid intake barrels per day
k = permeability, millidarcys
Δp = pressure drop across sand, lbs. per sq. in.
u = viscosity, centipoises
t = net sand thickness, feet
D = distance intake well to producer well feet
r_w = effective radius of input well, feet
w = distance intake to intake = 1.414 D. feet.

The writer has used this formula in calculating the approximate water intake of individual water intake wells in a water flooding five spot and good agreement has been had with field data. In order to facilitate the use of the equation in its application to field problems a nomographic or alignment chart has been prepared and is presented herewith.

It should be pointed out that the formula and chart can be applied more accurately to the determination of water intake volumes when water is first injected into the sand, due to the fact that the intake capacity decreases somewhat sharply during the first few weeks. The injected volume continues to decline until almost a steady or constant volume per unit of time is reached.

Intake Rate Factors

The initial water intake rate of an input well depends upon the effective permeability of the sand, the pressure drop across the sand, the viscosity of the water or water-oil mixture, the net sand thickness, and the effective radius of the well. As more water is injected into the sand several other related factors must be given consideration, but these will not be discussed here.

The permeability factor, k, is not the permeability of the extracted and dried sand to air as it is usually measured in the laboratory, but the effective permeability of the sand to water which is always less than the dry permeability. Frequently, the effective permeability of

NOMOGRAPHIC CHART FOR SOLVING WATER WELL INTAKE PROBLEMS IN FIVE SPOT WATERFLOOD SPACING PATTERN

BASED ON AN ADAPTATION OF MUSKAT'S FORMULA:

$$Q = \frac{.00154\ k\ \Delta p\ t}{u\left[\log_{10}\left(\frac{D}{r_w}\right) - .269\right]}$$

WHERE:
Q = WATER INTAKE BARRELS PER DAY.
k = PERMEABILITY OF SAND IN MILLIDARCYS.
Δp = PRESSURE DROP ACROSS SAND BETWEEN INPUT AND OUTPUT WELLS IN LBS. PER SQ. INCH.
t = NET SAND THICKNESS IN FEET.
u = VISCOSITY OF LIQUID UNDER RESERVOIR CONDITIONS, IN CENTIPOISES.
D = DISTANCE, IN FEET, BETWEEN INPUT AND OUTPUT WELLS.
r_w = EFFECTIVE RADIUS OF INPUT WELL BORE, IN FEET.

TABLE 1.

APPROXIMATE VISCOSITY CONVERSION TABLE

SAYBOLT SEC.	CENTIPOISES	SAYBOLT SEC.	CENTIPOISES	SAYBOLT SEC.	CENTIPOISES
32	1.40	90	17.90	350	75.50
34	2.18	100	20.20	375	83.00
36	2.92	120	24.90	400	87.50
38	3.62	140	28.50	450	98.60
40	4.30	160	34.10	500	110.00
45	5.90	180	38.60	550	121.00
50	7.40	200	43.10	600	132.00
55	8.92	225	48.70	700	154.60
60	10.20	250	54.30	800	176.00
65	11.50	275	59.90	900	198.00
70	12.80	300	65.40	1000	220.00
80	15.30	325	70.90		

TABLE 2.

VALUES OF $\left[\log_{10}\left(\frac{D}{r_w}\right) - .269\right]$ FOR VARIOUS DIA. HOLES

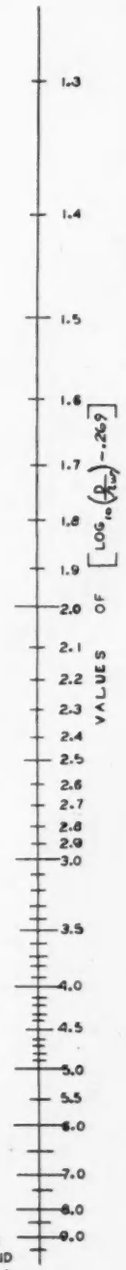
"D"	3" DIA.	4" DIA.	6" DIA.	8" DIA.	10" DIA.	12" DIA.	18" DIA.
50'	2.33	2.21	2.03	1.91	1.91	1.73	1.55
100'	2.63	2.51	2.33	2.21	2.11	2.03	1.85
150'	2.81	2.61	2.51	2.38	2.29	2.21	2.03
200'	2.93	2.81	2.63	2.51	2.41	2.33	2.15
250'	3.03	2.91	2.73	2.61	2.51	2.43	2.25
300'	3.11	2.99	2.81	2.68	2.54	2.51	2.33
350'	3.18	3.03	2.88	2.75	2.65	2.58	2.40
400'	3.24	3.11	2.93	2.81	2.71	2.63	2.45
450'	3.29	3.16	2.99	2.86	2.76	2.68	2.51
500'	3.33	3.21	3.03	2.91	2.81	2.73	2.55
600'	3.41	3.29	3.11	2.99	2.89	2.81	2.63
700'	3.48	3.36	3.18	3.05	2.96	2.88	2.70
800'	3.54	3.41	3.24	3.11	3.01	2.93	2.76
900'	3.59	3.46	3.29	3.16	3.07	2.99	2.81
1000'	3.63	3.51	3.33	3.21	3.11	3.03	2.85
1100'	3.67	3.55	3.37	3.25	3.15	3.07	2.90
1200'	3.71	3.59	3.41	3.29	3.19	3.11	2.93
1300'	3.75	3.62	3.45	3.32	3.23	3.14	2.97
1400'	3.76	3.66	3.48	3.35	3.26	3.18	3.00
1500'	3.81	3.69	3.51	3.38	3.29	3.21	3.03

DIRECTIONS

TO FIND "Q" WHEN OTHER VARIABLES ARE KNOWN:
① USE STRAIGHT EDGE, CONNECT VALUE OF "k", SCALE 1, WITH VALUE FOR "Δp", SCALE 2, AND MARK POINT OF INTERSECTION WITH "AXIS 1."
② CONNECT THIS POINT ON "AXIS 1" WITH VALUE OF "t", SCALE 4, FOR POINT ON "AXIS 2".
③ CONNECT POINT ON "AXIS 2" WITH VALUE OF "u", SCALE 5, FOR POINT ON "AXIS 3". TABLE NO. 1 WILL BE OF SOME HELP IN DETERMINING "u", IF SAYBOLT VISCOSITY IS KNOWN.
④ CONNECT POINT ON "AXIS 3" WITH VALUE ON SCALE 6, FOUND FROM TABLE 2, AND NOTE WHERE LINE INTERSECTS "Q", SCALE 3; VALUE OF "Q" IS ANSWER IN BARRELS PER DAY.

TO FIND "k" WHEN OTHER VARIABLES ARE KNOWN:
① CONNECT VALUE ON SCALE 6 WITH "Q", SCALE 3, AND EXTEND LINE TO LEFT FOR POINT ON "AXIS 3." ② CONNECT THIS POINT ON "AXIS 3" WITH VALUE OF "u", SCALE 5, AND EXTEND TO LEFT FOR POINT ON "AXIS 2." ③ CONNECT "AXIS 2" POINT WITH VALUE OF "t", SCALE 4, AND EXTEND LINE TO LEFT FOR POINT ON AXIS 1. ④ CONNECT THIS "AXIS 1" POINT WITH VALUE OF "Δp", SCALE 2, AND EXTEND LINE TO LEFT SO THAT IT CUTS SCALE 1. THIS POINT OF INTERSECTION ON SCALE 1 IS VALUE OF "k" SOUGHT.

NOTE: WITH SAME TYPE OF PROCEDURE ANY UNKNOWN MAY BE FOUND IF THE OTHER FIVE VARIABLES ARE KNOWN.



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a sand to water is often less than one-tenth of the dry permeability. The determination of the effective permeabilities of any particular sand can be made by means of the chart when the other variables are known and these average values may be used in subsequent problems.

The pressure drop "across the sand" may be determined from the well-head pressure plus the hydrostatic pressure of the column of water in the well and subtracting from this the reservoir pressure as determined from the height of the fluid standing in a well before water is injected.

The viscosity of the injected water is generally one centipoise, although really some knowledge should be had concerning the effective fluid viscosity of the reservoir water-oil mixture. In low oil saturation sands, 15 to 25 percent, the writer has used the value of one centipoise for viscosity with good results and a mean between the actual viscosity of the oil under reservoir temperature conditions and one centipoise (water) in cases where the oil saturation is higher than 25 percent. A table for the determination of viscosity in centipoises from the ordinary Saybolt viscosity value is presented with the chart for convenience.

The effective sand thickness must be determined by core analysis, and only the actual thickness of the permeable portions of the oil sand included in the total net thickness.

The effective radius of the well is ordinarily taken as the actual radius of the drilled hole, but of course is very difficult to determine in the case of a well which has been shot. In the comparison of intake rates of shot and unshot wells, it has been found that the cracks resulting from the shot have had the same effect as increasing the well radius several feet. A heavy shot will increase the intake rate four or more times.

Example Given

Although instructions are given in the lower right hand corner of the chart for its use, an example will be given in order to secure a more complete knowledge of its adaptability. Assume the following values:

$k = 150$ millidarcys

$\Delta p = 1000$ lbs. per sq. in.

$t = 15$ ft.

$u = 3$ centipoises

$D = 250$ ft.

$r_w = 6$ inches (.5 ft.)

and the need to determine the volume of water which could be introduced into an intake well with those characteristics.

On Scale 1("k"-permeability in millidarcys) at the extreme left edge of the chart locate the value of 150 millidarcys and with a straight edge connect this point with the pressure drop (Δp—pounds per square inch) value of 1000 pounds on Scale 2. Where the straight edge intersects Axis 1, mark a point. Next connect this point with the value of 15 on the sand thickness, Scale 4. Again where the straight edge intersects Axis 2, place a mark and connect this point with the value of three centipoises (u—viscosity in centipoises) on Scale 5. The next step consists of marking the resulting intersection with Axis 3 and connecting this point with the proper value of $\left[\log_{10}\frac{(D)}{(r_w)} - 0.269\right]$ on Scale 6 at the extreme right hand edge of the chart. In order to eliminate tedious calculations in determining this value, Table 2 in the chart has been included. In the problem now being solved where "D" is 250 feet and the "effective radius" is three inches (diameter six inches) the value to be used from the table is seen to be 2.73. As before, connect the point placed on Axis 3 with this value of 2.73 on Scale 6 and in the center of the chart read the value of 475 barrels per day where the line intersects Scale 3 (Q—barrels per day). In other words, an intake well with the sand characteristics designated should take 475 barrels of water per day.

New Mexico Oil Scouts Honored

Pictured here are members of the New Mexico Oil Scouts Association at a recent "appreciation dinner" given them by the Artesia Chamber of Commerce. Back row, left to right: Raymond Miller, State Conservation Commission, Artesia; Gene Roberts, Jr., secretary of New Mexico Association, Drilling and Exploration Company, Hobbs; W. C. Mitchell, association president, Continental Oil Company, Midland; Chuck Aston, consulting geologist, Artesia; Emery Carper, of Carper Drilling Company, Artesia; A. P. (Doc) Mahone, Mayor of Artesia; Artie McAnally, Chamber of Commerce president.

Second row: Sam Brown, Western Gas Company, Jal; R. M. Knepfel, The Atlantic Refining Company, Carlsbad; Fred Tyner, The Pure Oil Company, Roswell; Niven Baird, American Republics Corporation, Artesia; T. A. Frazer, Phillips Petroleum Company, Midland; Ralph Hickman, Humble Oil & Refining Company, Midland; Al Bleakley, Stanolind Oil and Gas Company, Midland; Frank Stahl, U. S. Geological Survey, Artesia; Jerry Curtis, Magnolia Petroleum Company, Roswell; W. H. Gray, Sun Oil Company, Roswell.

Front row: R. L. Walker, Amerada Petroleum Company, Midland; George Carr, Richfield Oil Corporation, Midland; Bill Wilson, Sinclair Prairie Oil Company, Midland; Jim Walton, Superior Oil Company of California, Midland; Jack Lively, Standard Oil Company of Texas, Midland; W. M. Fitzgerald, American Trading and Production Company, Midland; J. H. Burton, Cities Service Oil Company, Midland.

Other scouts attending but not shown in the picture were: From Midland: H. E. Littlejohn, Tidewater Associated Oil Company; James Maedgen, Skelley Oil Company; H. R. Harris, Sun Oil Company; Tom J. Murphy, The Texas Company; W. M. Fitzgerald, American Trading and Production Company. From Artesia: N. W. Krouskop, Grayburg Oil Company; C. T. Young, Malco Refineries, and Raymond Lam, New Mexico Bureau of Mines. From Hobbs: Duncan Schwanecke and A. H. Petsch, Ohio Oil Company and J. C. Cathey, Drilling and Exploration Company; Roger Harrold, Ohio Oil Company, Seminole; and Jack Burson, Shell Oil Company, Lovington, also were present.

Oil Properties Acquired

Ring Oil Company, Los Angeles, has acquired the oil properties of Dwight Vedder, also of Los Angeles, in the Mount Poso and Sharktooth areas of Kern County, California. The deal involved 560 acres and seven producing wells as Mount Poso, averaging 6000 barrels a month, and 80 acres of land in the Sharktooth area; along with 25,000 feet of casing and other equipment.

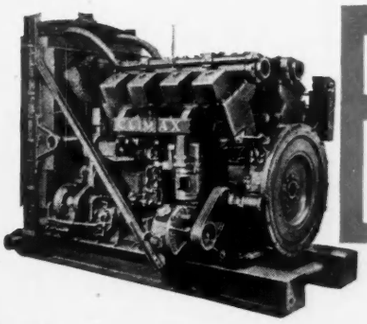
Information Service

Petroleum Information, a Rocky Mountain oil information service established in 1929 by C. Earl Shoenfelt, has been purchased by Maurice and Bill Goodin, who will continue the publication from offices in the Continental Oil Building in Denver.

Maurice Goodin has worked in the oil business in the Rocky Mountain area for the past ten years and will leave the position of land man for Sinclair Wyoming Oil Company to engage in the information service. He spent three years as air force intelligence officer in the South Pacific and European theaters. Bill Goodin has recently been placed on inactive status with the Army after serving as intelligence officer in Korea and other Pacific areas. *Petroleum Information* publishes scouting reports of all oil activity in the Rocky Mountains.

New Field Proposed

A division of the Yates field of Pecos County, Texas, was proposed by Frank A. Perry at a hearing before the Texas Railroad Commission last week. The proposed "Perry field" has fourteen wells, all of which produce from the Queen sand.



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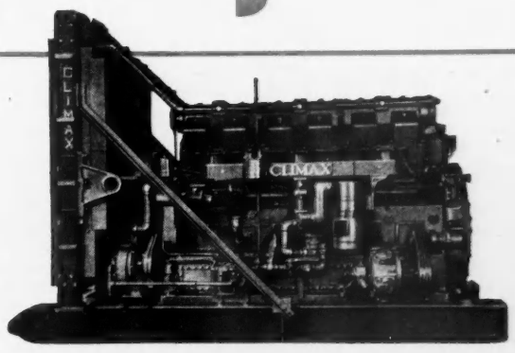
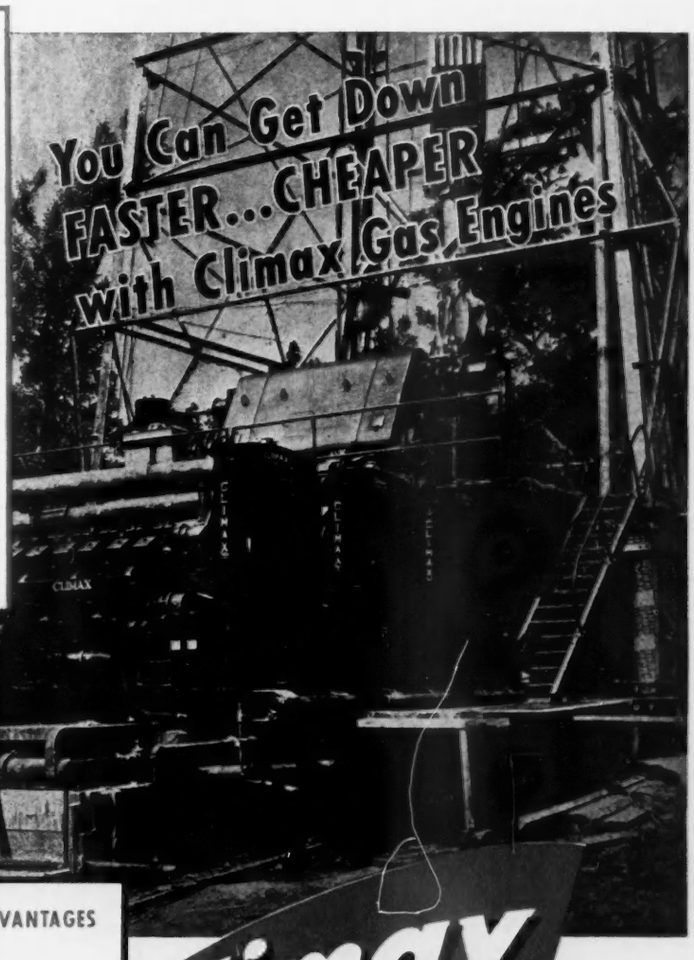


AT TOP: Heavy duty, compact Climax VU-280 rated 280 h.p. at 1100 r.p.m. with radiator, fan and other accessories. 8 cylinder, 4 cycle, "V" type.

ABOVE: Heavy duty, compact Climax VU-420 rated 420 h.p. at 1100 r.p.m. with radiator, fan and other accessories. 12 cylinder, 4 cycle, "V" type.

AT RIGHT: 3 Husky Climax VU-420's (compounded to produce 1250 h.p.) speed-up drilling—hoist heavy loads of drill pipe fast—on this deep East Texas wildcat.



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Multi-Cylinder Pumping Engines

THEIR CARE AND MAINTENANCE

By EUGENE HOSFORD, District Engineer, Eastern Production Division
Gulf Refining Company, Mt. Pleasant, Michigan

THE multi-cylinder engine or power unit has been employed extensively as the prime mover to pump oil wells. Experience has indicated the necessity of following certain rules in the operation of these units and some of these will be presented and discussed in this article. The article will be confined to the water-cooled multi-cylinder engine using gas or gasoline as a fuel.

Selecting the Engine

Particular attention must be given the selection of an engine and the engine properly applied to the job, or no amount of care on the part of the pumper or operator would be sufficient to bring about satisfactory operation. The selection of an engine on price alone is economic folly. The engine selected should be of good design and preferably, of the slow-speed, heavy-duty type to obtain maximum service. The flywheels should be sufficiently large to promote smooth operation. The engine should be equipped with water temperature and oil-pressure safety switches, oil filter, oil-bath air cleaner, electric starters where possible, a reliable clutch, large radiator and slow-speed fan, and be properly protected from the weather, if an outdoor installation is planned. The material used and the design of the engine is best left to the engine manufacturer, but if experience reveals a need for a change, the manufacturer should welcome suggestions. Most engine manufacturers can furnish a good oil well pumping engine from their standard industrial power units. It becomes the job of the engineering or purchasing department to specify the size and type of engine desired.

Standardization Advantage

The advantages of standardization of one make of engine in a pool or area are generally recognized. One advantage which might be stressed is that the pumper is not required to remember a maze of operational instruction on several engines but, rather, can become efficient in the operation of one make.

The comparative advantages of a multi-cylinder engine over a single cylinder engine or vice versa, is not discussed herein but it is believed that where the well has an expected life of ten years or more and in excess of 25 horsepower is required for pumping, the higher investment and installation cost of the single-cylinder engine with engine house, belt idler, clutch, etc., is justified from the standpoint of more economic operation and lesser downtime. On the other hand, if the well pumps for only a few years, and the equipment is moved to another well, the saving in initial investment and installation costs by use of a multi-cylinder engine are considerable. On sizes smaller than a nominal rating of 15 horsepower, the single-cylinder and multi-cylinder engines are more nearly competitive in initial costs, installation costs and repair expense.

Apply with Care!

After the engine has been selected, it must be applied with care. The use of too small an engine on a well will result in excessive repairs and frequent overhaul jobs. The advantages of too large an engine by far exceeds the disadvantages. The most serious objection to the use of an engine too large for a job is the initial investment and, where fuel is purchased, higher fuel cost. Of course, the purchase of an engine two or three times the size needed could not be recommended, but 10 to 25 percent surplus horsepower means longer service and fewer repairs.

The author believes that, in very few cases, should an engine be selected for a pumping job if it has an API horsepower rating less than eight at normal speeds. This is especially important where downtime is a factor. Experience indicates that frequency of repair jobs and downtime increase as the size of engine decreases. Larger engines mean higher initial cost but less repair expense and more continuous operation. These together with higher salvage value and greater range of application, will compensate for the difference in cost.

Factors Listed

In the application of an engine to a pumping job, the depth of the well, fluid gravity, type of recovery mechanism, maximum expected fluid production and operating speed are some of the factors which should be known. Where there are several wells already operating in a field, the wells may be weighed with a dynamometer and a card obtained such as shown in Figure 1. From these data, the polished-rod horsepower, prhp, can be calculated. Dividing the prhp by the assumed efficiency through the pumping unit and belt drive, 80 percent as an average, the required brake horsepower of the engine can be determined. For instance, an engine selected to pump a well with the characteristics, shown in Figure 1, should be rated in excess of $\frac{22.9}{.08}$ or 28.6 horsepower at the desired operating speed.

On wildcat wells, the maximum fluid

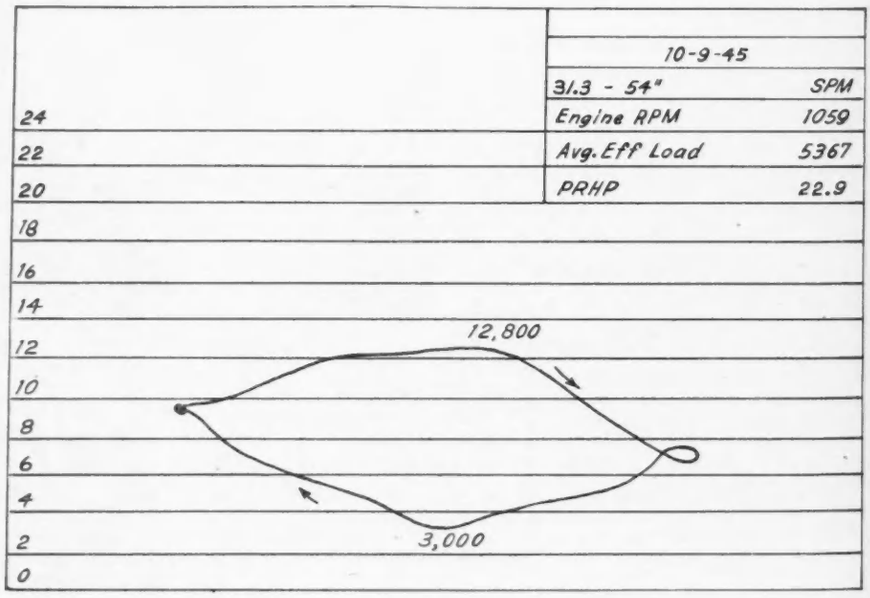

Figure 1. Dynamometer Card. Required engine brake horsepower calculated by dividing PRHP by efficiency through pumping unit and belt drive, assumed at 80 percent.

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A "Caterpillar" Diesel D7 Tractor with bulldozer digging a slush pit in an oil field near Dix, Illinois. The owner is O. A. Holdren, Mt. Vernon, Illinois.

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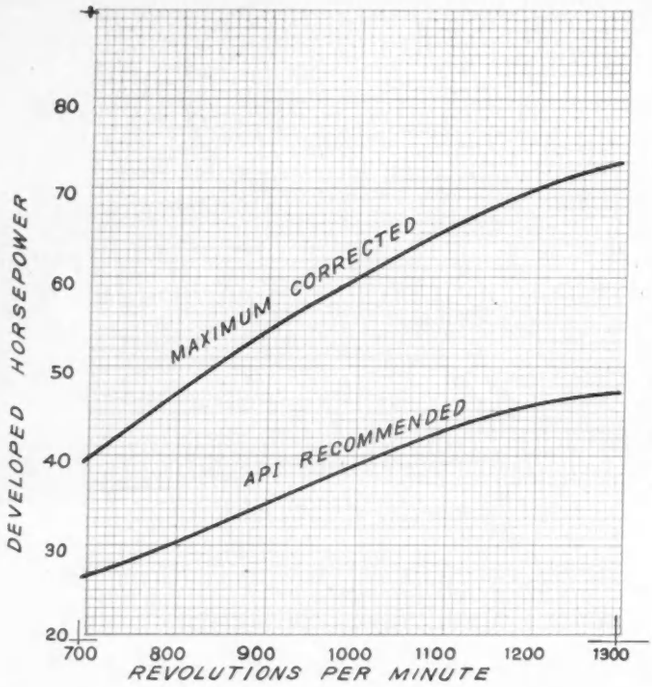

Figure 2. Power Unit, horsepower curves 4-cylinder water-cooled, 471-cubic-inch gas engine, 5-inch bore x 6-inch stroke.

production can be estimated and the size of an engine may be determined as follows:

Engine brake horsepower required = Hyd hp × 2.5

$$\text{Hydraulic hp} = \frac{\text{Fluid prod, (bpd)} \times \text{total depth, (ft)} \times 350}{24 \times 60 \times 33{,}000}$$

Where: Fluid specific gravity is assumed as 1.0 and the lift the same as total depth

For instance, if the maximum expected fluid production is 400 barrels per day and the well is 3600 feet deep, then the

$$\text{Hydraulic hp} = \frac{400 \times 3600 \times 350}{24 \times 60 \times 33{,}000} = 10.65$$

Engine bhp required = 10.65 × 2.5 = 26.6 hp

If the size of engine selected is based on calculations from the hydraulic horsepower, it is certain that the engine will be sufficiently large to pump the well without danger of overloading. Actually, there are other factors such as pumping fluid level proration, declining production, assistance from gas, expected life of well, etc., which should be considered but the above method will indicate the maximum size needed. The other factors may be taken into consideration after the well has been placed on the pump and dynamometer tests conducted.

Selecting the Engine

The required brake horsepower of the engine for the desired well cycle having been determined, the next step is to select an engine to satisfy these conditions. Upon request, the engine manufacturers will supply API horsepower curves on their engines. A set of such curves is shown in Figure 2. The upper curve is the "power unit" maximum brake horsepower curve, which is the greatest horsepower, corrected to standard conditions, that continuously can be sustained at any given rotational speed under the conditions outlined under the API test procedure. A "power unit" is an engine complete with all accessories, except muffler, supplied or recommended by the manufacturer. The lower curve, the API "power unit" horsepower curve, is 65 percent of the "power unit" maximum brake horsepower at any given speed within the range specified. Additional information can be obtained from "Supplement No. 1 to API Std. 11-C, Internal Combustion Engines and Clutches for Oil Field Services."

Now, if it is found that the required engine brake horsepower amounts to 26.6, the engine, for which the API horsepower curves are presented in Figure 2, should satisfactorily handle the well. The "extra" horsepower at speeds from 750 to 1000 revolutions per minute may mean lesser repair expense and longer service.

When the engine is installed, vibration should be eliminated wherever possible. While the smaller engines are commonly installed on extended base of the unit, separate skids may be advisable for engines with a displacement of 450 cubic inches and up.

Assuming the proper selection and application has been made, the economic life and repair expense of an engine will depend upon its care and maintenance. If care is stressed, the maintenance factor becomes less significant.

Care of Multi-Cylinder Engines

The importance of the proper care of oil field engines cannot be overestimated. Among the benefits are reasonable engine repair expense, minimum downtime, maximum service and elimination of complete failure from neglect. The pumper, or operator, will receive more in return than a feeling of pride for his mechanical skill. His "extra" time spent in taking the proper care of an engine will mean fewer times to crank or start an engine, elimination of "tinkering" to find the cause of trouble and, not the least, the heart-felt appreciation of his foreman and the field mechanic.

The first responsibility of proper care cannot be placed on the pumper. If he is not informed or taught the proper method or technique to be used in operating an engine, he cannot be expected to become a diligent operator. Thus, someone "up the line" must assume the job of educating him. In the smaller companies, the foreman may realize the need for his instruction and solicit the assistance of a mechanic, if needed. In the larger companies, the matter is of sufficient economic significance to justify the assignment of one or more individuals in the engineering department to formulate some policy after due consultations with the operating personnel, mechanic and engine manufacturers. Several of the major companies print and distribute detailed instructions to their pumpers.

One major company has issued a series of operating bulletins to the personnel on the proper operation of equipment and some instructions from one of the bulletins, on the care of multi-cylinder engines, have been included in the following discussion. Instructions pertaining to the operation of any particular type of engine have been omitted from this article. However, instructions peculiar to one kind of engine should be included in the bulletin when issued to the pumper. A bulletin of this type may seem superfluous, since a book of instructions is furnished by the engine manufacturer. However, this book, while quite valuable to the mechanic or skilled operator, may contain instructions which the pumper is not required to know and may also include rules of operation which, through experience, the oil company believes impractical. In other words, the bulletin, as issued to the pumpers, should be a brief, concise set of rules which can be followed by anyone even though not a skilled mechanic. If the pumper is expected to repair the engine himself, then a complete book of instructions with the above-described bulletin should be furnished him.

Before delving into the reasons back of each of the instructions listed, it should be emphasized that the instructions so listed should not be open to argument or criticism. They are based on the experience and opinions of several engineers, superintendents, foremen, mechanics and other operating personnel. Actually, all these may not have agreed to each of the instructions as written but as an overall picture they represent a practical and brief program to assure proper engine operation.

Engine Lubrication

It would be impossible to list the most important rule for proper care of an engine but certainly, adequate and good lubrication should be emphasized. Special lubricating oils are not required for oil field engines; in fact, the best grades on the market are not believed absolutely necessary in engines operating at constant speeds and uniform loads. It has been found that the oil should be of good quality and conform closely to the specifications listed in Table 1.

To aid in starting, and to keep friction at a minimum, it is considered good practice to use the lightest oil possible in an engine and still keep consumption

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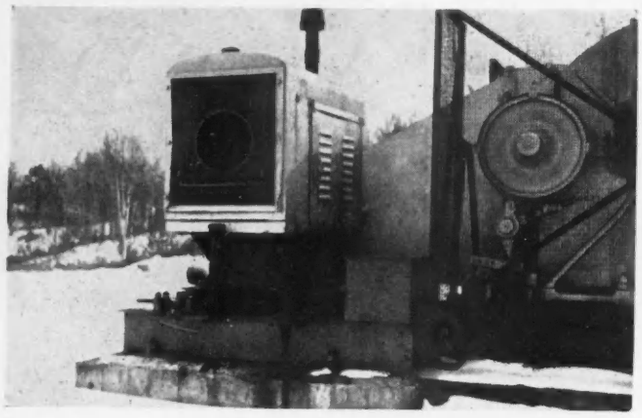

Figure 3. Radiator curtain on 471-cubic-inch engine. Note various adjustments.

Figure 4. Drip (8⅝-inch x 5-foot) before being buried. Gas from casinghead enters drip through 2-inch line on right, travels length of drip and passes through 2-inch line on left to the engine gas volume tank. One-inch blow-off line shown, extends one inch from bottom of valve. Back-pressure valve maintains 30-40 psi pressure.

Figure 5. Layout of fuel gas connections where casinghead gas used as fuel. Gas from casinghead travels through drip (vent shown in background) and thence through a regulator, into a gas volume tank or scrubber and to the engine.

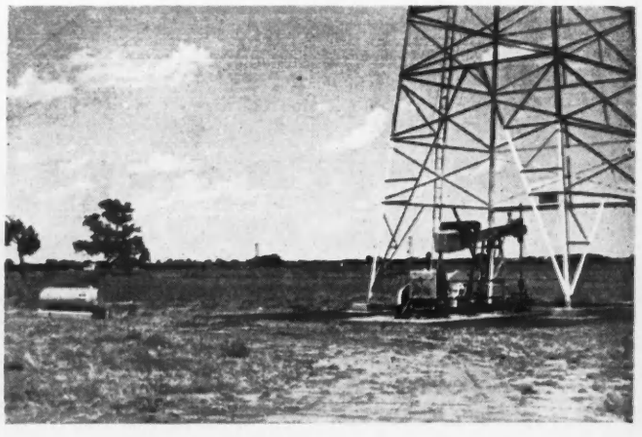

Figure 6. Butane tank (36 x 120 inches, 125 psi working pressure) 50 feet from engine. Tank equipped with pressure-relief valves, special filter valves, rotary tank gauge, pressure gauge, etc. Connected to engine by ⅜-inch fuel line.

low. This practice, of course, is dependent on the oil retaining its lubricating properties at high temperature. Some engine manufacturers specify the weight of oil depending on oil temperature, size, bearing clearances, etc. However, generally speaking, for engines up to 500 cubic inch displacement SAE 30 oil can be used in warm weather (from May through September in the Southwest) and SAE 20 oil the remaining months. In Michigan and other colder areas, it has been found advisable to use SAE 10 oil in winter (November through March) and SAE 20 oil during other months. If oil consumption increases because of worn rings, with the motor in otherwise good condition, SAE 40 oil may be used. In case of an emergency, SAE 50 oil has been used for short periods.

Oil Changes

The frequency of oil changes is a controversial subject. Experience has shown that the frequency of changing oil in the crankcase will depend upon hours operated, load, oil temperature, type of fuel used, condition of engine, etc.; consequently, any definite interval cannot be set. The best rule is to change oil when it becomes discolored. As an experiment, one company adopted a program of changing oil every 300 hours, and more often, if it became discolored or broken down. After two or three years, the instructions were changed to the above when it became apparent that the oil drained from some engines was clear and apparently as good as when placed in the crankcase. Because of the possibility of running an engine too long without an oil change, it is believed that the oil should be replaced every two months regardless of the number of hours operated. Further, if oil becomes discolored or broken down in less than 100 hours, a mechanic should be requested to check the engine condition and operation.

As a note of warning, changing of oil involves more than simply draining out used oil and replenishing the supply. Sometimes, because of poorly designed crankcases and sometimes, because of heavy oil in the crankcase, when the drain is opened, the heavier lubricant or "sludge" remains in the pan.

If the crankcase has no inspection plate, the crankcase oil should be drained while still hot and the crankcase then filled with six quarts of cleaning oil. The motor should be run from five to six minutes and then drained.

If the crankcase has an inspection plate, remove the plate at each oil change and wipe out the pan with a clean cloth saturated with kerosine. Waste should not be used, as the lint may catch on the rough surface of the casting and later clog the oil lines. Once every three months, crankcase cleaning oil should be used as above.

Overfilling of the crankcase should be avoided, as this may permit the connecting rods to dip into the oil supply, thus splashing an excessive quantity of oil on the cylinder walls, causing smoking, oil pumping, waste, excessive carbon deposit, fouled spark plugs and sticky valves.

Most power units are equipped with oil filters. Where the filter is of the replaceable element type, the filter element should be replaced at the time of each oil change. This may vary with the type of oil filter but the above rule is believed safe for any filter.

Crankcase Sludge

Probably the most disastrous effect on lubrication comes from "sludge" in the crankcase. There is some disagreement as to just what "sludge" is, but it can be recognized as a thick, viscous oil-water emulsion, usually carrying some solids. The formation of sludge in the crankcase is due to oil contamination caused by water of combustion in exhaust gases which passes the rings, cools and condenses in a cold crankcase. The quite obvious remedy is to have the en-

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gine operating temperature high enough to prevent condensation. The operating temperature of the engine should be in excess of 160° F and the vapors should be vented from the crankcase through a breather or other means. Worn rings will aid "sludging" but the effect can be minimized if the above rule is followed.

Valve-top oilers are being installed on some power units. It is extremely important that, when used, they deliver the proper amount of oil. The supplier of valve-top oilers will furnish detail instructions. The following method has been found satisfactory when a steady flow of oil to the valves is not desired: Once each week open the feeder valve on the valve-top oiler while the engine is running at a speed slightly faster than idling. Allow the oiler to feed for ten minutes. Stop engine, close the feeder valve, and allow the engine to stand for at least ten minutes. Start the engine, but allow the feeder valve to remain closed until the next treatment.

The use of oil safety switches is highly recommended. This switch is installed in the oil-pressure line and, in event of failure of the oil pump or supply of lubricant, the switch grounds the magneto and shuts down the engine. The oil safety switches should be checked each time the oil is changed. This may be done by removing the drain plug and allowing the engine to run until the switch has a chance to shut the engine down. An alternate test method is to loosen the oil-pressure relief plug; the engine will stop immediately if the switch is in working order.

To keep the clutch properly lubricated, it has been found that the clutch bearings should be greased with high-pressure grease every other week, using four strokes from the grease gun. Defective grease fittings should be replaced promptly. The clutch-shifting collar should be greased every other day, using two strokes from the grease gun.

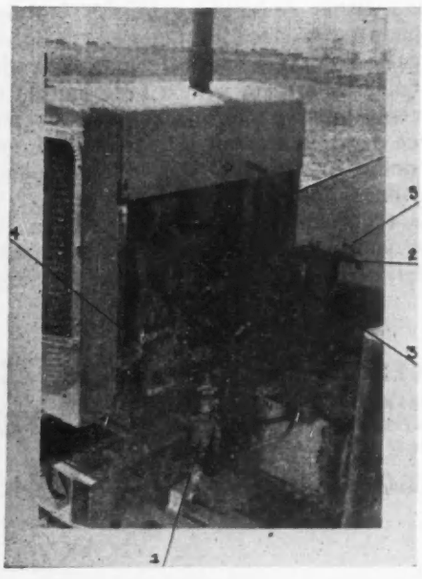

FIGURE 7

Butane equipment on 201-cubic inch engine.

1. Filter and shut-off valve assembly, which removes foreign material from liquid butane and allows a shut-off at the engine.
2. Regulator—reduces pressure as high as 30-80 psi to 3-8 psi.
3. Vaporizer—its function is to vaporize liquid butane.
4. Sensitive regulator—reduces pressure from 3-8 psi to a pressure less than atmospheric.
5. Pressure-relief valve.

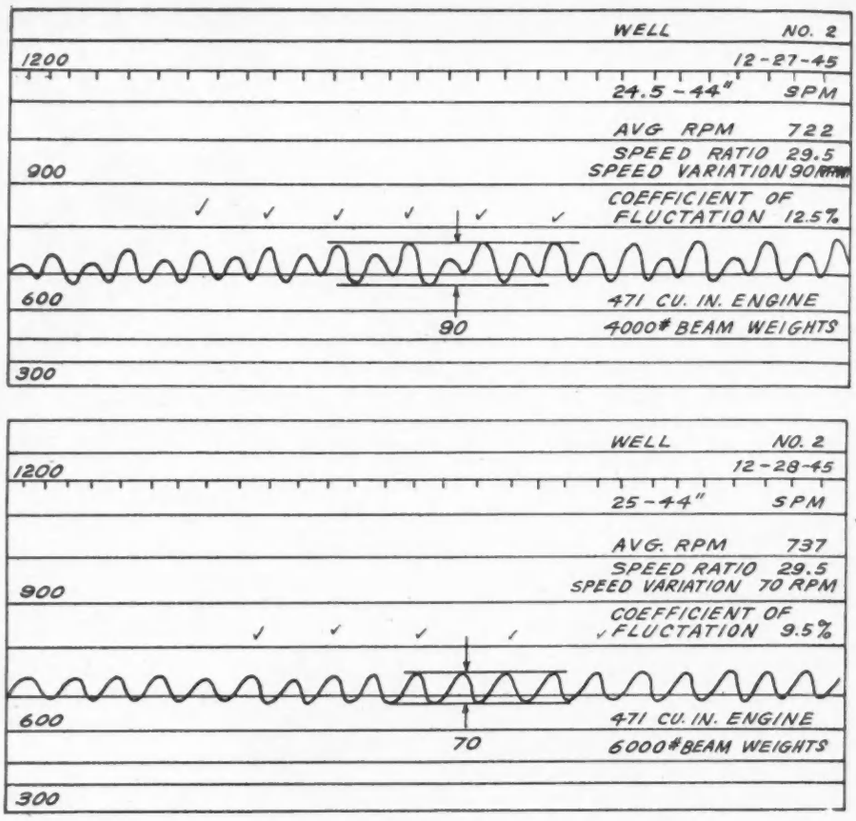

FIGURE 8

Hand tachograph records showing speed fluctuation and well balance before (upper chart) and after (lower chart) installing additional counterbalance weights.

As mentioned before, low-operating temperatures tend to cause "sludging," which may mean loss of bearings. Other effects of low temperature are excessive wear of piston rings, cylinder walls and broken valve springs or stuck valves. Where gasoline is used as a fuel, dilution of crankcase oil may result. The water temperature should be maintained in excess of 160° F and as near 180° F as possible. Since the majority of engines are not equipped with temperature gauges and the pumper may not have a thermometer available, a good rule to follow is "If the hand can be held on the radiator longer than one second, the engine is running too cold."

There are several means of controlling the water temperature but the one most commonly used is the by-pass thermostat usually installed in the radiator hose from the block to the top of the radiator. When the engine is started cold, part or all of the coolant is deflected from its normal passage through the radiator and is returned to the water pump inlet and circulated through the water jacket without being cooled. As the water temperature increases, the thermostat closes the by-pass and all water is circulated through the radiator. The adjustable thermostat has been found the most satisfactory. The thermostats should be replaced immediately if faulty.

In extremely cold weather, the thermostat may fail to maintain the desired operating temperature and it becomes necessary to cover all or part of the radiator. Manually operated radiator curtains can be purchased and a photograph of one installation is shown in Figure 3. When the engine temperature cannot be maintained with a thermostat, a radiator curtain should be installed.

Probably, the most important rule to follow in the care of radiators and the cooling system is to keep the radiator filled with clean, soft water. In general, water suitable to drink is also satisfactory for radiators. However, the water should be relatively soft so that scale will not be formed in the water jacket and water passages. Resultant inadequate and uneven heat dissipation will not allow normal expansion and excessive wear may be expected in rings, cylinder walls, etc. Chemical treatment of extremely "hard" water is imperative. Salt content should not be high because concentration in presence of oxygen causes corrosion. The salt content should not exceed 1000 parts per million as Cl. Muddy water should never be used and in using swamp water, care must be exercised since it may carry twigs, leaves, etc., which will clog the water passages. Several good rust inhibitors are on the market and one should be used. A rust inhibitor will correct corrosion due to dissolved oxygen and will have some preventive action on scale formation.

The pH Value of the water should be kept between 7.5 and 9. A pH value of 7.0 indicates that the water is neither acidic nor alkaline. The approximate pH value may be obtained by use of litmus paper available through one of the companies selling radiators.

Permanent-type antifreeze is recommended for the radiator,b ut alcohol may be used. However, if alcohol is used, the radiator fluid should be checked with a hydrometer at frequent intervals to be certain that there is sufficient antifreeze. Alcohol is lower in initial cost but if the proper engine operating temperature is maintained, the alcohol may evaporate to such an extent that permanent type antifreeze would have been cheaper in the end. Further, permanent-

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Figure 9. Service Chart, Showing Troubles and Possible Causes

Engine Hard to Start:

1. BATTERY:
(a) Battery not fully charged*
(b) Loose connections.
(c) Solution low.
2. MAGNETO:
(a) Worn brushes.
(b) Oil or water soaked.*
(c) Coil damaged.*
(d) Brushes sticking.
(e) Magnets weak.*
(f) Condenser faulty.*
(g) Points worn or pitted.
(h) Points sticking.
3. DISTRIBUTOR:
(a) Points worn or pitted.
(b) Points sticking.
(c) Oil or water soaked.*
(d) Cap shorted.*
(e) Condenser faulty.*
4. FUEL SYSTEM:
(a) No fuel in tank.
(b) Fuel flow obstructed.
(c) Air vent clogged.
(d) Fuel pump filter clogged.
(e) Carburetor flooded.*
(f) Water in fuel supply.
(g) Improper fuel mixture.*
5. MISCELLANEOUS:
(a) Defective wiring.
(b) Spark plugs cracked or shorted.
(c) Spark plugs fouled.
(d) Cables connected to wrong plugs.
(e) Throttle or governor levers loose on shafts.
(f) Intake manifolds or gaskets leaking.
(g) Valves not seating.
(h) Improper timing of ignition or valves. Improper tappet clearance.
(i) Muffler clogged.

Engine Knocks:

1. Excessive carbon deposits.
2. Loose main bearing.
3. Loose rod bearing.
4. Valve tappet clearances too great.
5. Valves not free in guides.
6. Worn pistons, piston pins or cylinders.
7. Engine overheated.
8. Tight pistons or pins.
9. Loose flywheel.
10. Lack of oil or water.
11. Worn timing gears.
12. Spark advanced too much.
13. Fuel not suited to engine.

Engine Missing:

1. Spark plugs fouled.
2. Spark plugs cracked or shorted.
3. Improper spark plug gap.
4. Defective wiring.
5. Ignition breaker points sticking.
6. Improper breaker point gap.
7. Faulty condenser.
8. Cylinder head gasket leaking.
9. Intake manifold or gaskets leaking.
10. Valves warped or broken.
11. Valves, tappets sticking.
12. Valve tappets improperly adjusted.
13. Valve springs weak or broken.
14. Dirt or water in fuel system.

Excessive Smoke from Exhaust:

1. Too much oil in crankcase.
2. Carburetor needle valve open too far.
3. Carburetor float sticking or leaking.
4. Lubricating oil too thin.
5. Worn bearings, rings, cylinders and valve guides.

Explosion in Muffler:

1. Spark retarded.
2. Weak spark.
3. Valves not seating or out of time.
4. Exhaust valves warped.
5. Missing on one or more cylinders.

Engine Overheating:

1. Lack of water.
2. Fan belt slipping.
3. Water hose obstructed.
4. Carburetor choke control partially pulled out.
5. Improper fuel mixture.*
6. Radiator clogged.
7. Cylinders limed.
8. Improper ignition timing.
9. Valves leaking.
10. Oil badly diluted.
11. Lack of oil.

Engine Lacks Power:

1. Valves warped or stocking.
2. Valve seats worn.
3. Cylinders or pistons badly worn or scored.
4. Piston rings weak or worn.
5. Piston rings sticking.
6. Improper fuel mixture.
7. Improper timing of ignition or valves.
8. Muffler clogged.
9. Governor or throttle levers loose on shafts.
10. Oil badly diluted.
11. Air cleaner requires cleaning.
12. Fuel not suited to engine.

Explosion in Carburetor or Intake Manifold:

1. Fuel mixture too lean. See carburetor manufacturer's instructions herein.
2. Valves or tappets sticking.
3. Intake valve springs weak or broken.
4. Intake valves warped or broken.
5. Intake tappets set too close.
6. Incorrect timing of ignition or valves.
7. Intake manifold or gaskets leaking.
8. Cylinder head gasket leaking.

Poor Compression:

1. Valves not seating.
2. Valves or tappets sticking.
3. Valve tappets set too close.
4. Valves incorrectly timed.
5. Weak valve springs.
6. Piston rings sticking, weak or worn.
7. Loose or cracked spark plugs.
8. Cylinder head gasket leaking.
9. Lubricating oil too thin.
10. Scored or worn pistons or cylinders.

(Courtesy LeRoi Engine Co.)

type antifreeze often can be saved from one winter to the next and usually contains a rust inhibitor.

Water pumps must be kept in good repair. Water-pump grease only should be used. On pumps equipped with grease cups, grease once each day by making one complete turn of the grease cup cover.

The fan belt should be checked for proper tension and condition each time the engine is down. The belt is in proper tension when it can be deflected by hand ¾ inch midway between pulleys without appreciable effort. The water-temperature safety switch will ground the magneto and shut down the engine, if the engine becomes too hot. While there is no suitable means to test this switch in the field, it may be checked in a shop. In any event, it is deemed advisable to check or replace the switch once each year.

When valve clearances are not properly maintained, the resulting effect may be burnt valves, excessive engine temperatures, a "miss" with insufficient power developed, and overall unsatisfactory operation. While some companies chanic, others expect the pumper to perform this job. A few minutes of a mechanic's time is sufficient to show the pumper how to set the tappets. Valve clearances should be checked once each month and adjustments made when necessary. Engines must be hot when valve adjustments are made or checked. The engine manufacturer will specify the clearances between the rocker arms and valve stems and this information should be passed on to the pumper. When making adjustments, valve springs should be checked for valve-spring breakage and the nuts on the rocker arm stand should be checked and kept tight.

Failure or trouble with the ignition system probably accounts for more downtime than any other part of the power unit. Clearance between spark plug points should be maintained at 0.025 to 0.030 inch. Improper clearance may mean not only "missing," but also premature failure of the magneto. All defective wiring should be replaced promptly. If the magneto becomes noisy, the distributor bearings should be leave valve adjustments to the field megreased. In case the noise continues, the magneto should be replaced promptly.

The generator should be lubricated with three drops of motor oil once each week in each cup. Once each month, it is advasible to remove the generator-brush inspection band. If brushes are worn, they should be replaced. If the commutator is dirty, it should be cleaned with a fine grade of sand paper. The starter should be lubricated with three drops of motor oil once each month in each cup.

Batteries must be checked weekly and the liquid level kept just above the plates. Distilled water only should be used. The battery terminals should be kept clean and well-greased and connections kept tight. If the engine is not equipped with a voltage regulator, a ground switch may be installed. The battery then can be kept on charge two days per week and the generator grounded the other five days. A hydrometer is used to check the battery if it appears weak. For the battery to op-

FIGURE 10—INSPECTION SHEET

Well—John Doe No. 1 Date 11-2-45

Engine Type	201 cu. in., 4″x4″, Water-cooled	RPM 926
	Cycle—21.2—26″ spm	Engine Pulley—7″ 3C
Pumping Unit	10 hp	Serial No. 12650
Counterbalance	Satisfactory	Total Counterbalance—3200 lb

ENGINE CONDITION

Electric System	Battery—OK, no lock on box	Spark plugs—OK
	Magneto—OK, needs greasing	Wiring—Bad to oil press. switch
	Starter—OK	Generator—OK
Cooling System	Radiator—OK	Thermostat—Yes
	Hose—OK	Curtain—Yes, not on
	Fluid—Dirty	Anti-freeze—Permanent, OK
	Fan Belt—OK	Water Pump—OK
Safety Switches	Oil—Yes	Water—Yes
Bearings	OK	
Clutch	Alemite fittings broken off	Bearings—OK
Valves	Clearance—Close, adjusted	Type of rocker-arm support—soft
	Compression—85–95–85–115	
Oiling Systems	Gaskets—OK	Oil Condition—OK
	Oil Seals—OK	Type of filter—XXX
Fuel System	Type—gas, needs new hose	Fuel pump—Yes——No X
General Motor Condition	Good	
Recommendation	Grease magneto, install alemite in clutch and grease, install lock on battery box, replace soft rocker-arm supports with cast iron, replace fuel-gas hose.	

erate properly, the hydrometer reading should be above 1150.

Fortunately, one of the best fuels obtainable, natural gas, is often available for use in the pumping engine. However, at times, natural gas is "sour" and rapid corrosion of engine parts and frequent overhaul jobs may be expected. Hydrogen sulphide in the gas chamber combines with moisture in the crankcase to form sulfurous acid which causes pitting of valves, cylinder walls, and other parts. Treatment of the gas to remove the hydrogen sulphide has, in general, proven quite expensive for individual installations and is not entirely satisfactory. The most successful method used in combatting corrosion from sour gas is to maintain high operating temperatures. Vapor-phase cooling systems have been employed quite extensively in some areas for this purpose.

Where the pumping wells do not produce sufficient gas to justify the installation of an oil and gas separator and a fuel gas system, green gas direct from the casinghead is used as fuel. In the winter, regulators and back pressure valves often freeze, causing the pumper no end of trouble. The use of drips may not entirely eliminate freezing but will reduce downtime considerably. A photograph of a drip used to remove liquids from casinghead gas is shown in Figure 4 and the complete fuel-gas layout is presented in Figure 5.

The pressure on fuel-gas systems usually ranges from ten to 40 pounds per square inch. The pressure is reduced to four to six ounces by a regulator on the gas line just before the volume tank and is further reduced by the small regulator on the engine proper.

Gasoline is quite often used where natural gas is not available. In the use of gasoline, the engine temperature should be maintained sufficiently high so that the fuel is vaporized and thus dilution of the crankcase oil by unburned gasoline is prevented. Rapid acceleration is not required of oil field engines. Accordingly, there is no reason to purchase high octane gasoline for such service. Low octane gasoline gives cheaper and excellent service in engines properly adjusted.

If gas it not available, commercial butane may be a desirable fuel for the oil field engine. Prior to the war, butane installations were being made in increasing numbers. Where sweet natural gas is available for any price less than 60 cents per 1000 cubic feet, the use of butane is usually not profitable. However, a substantial saving over the use of gasoline as a fuel sometimes may be realized by the purchase of butane. Special equipment and care must be employed if butane is used as a fuel. Photographs of butane equipment used on a single-well installation in Kansas are shown in Figures 6 and 7. A 36 x 120 inch, 510-gallon capacity, 125 psi working-pressure butane tank was installed at the location. The butane tank was equipped with pressure-relief valves, rotary tank gauge, special filter valves, etc. The entire installation was approved by the Kansas fire marshal.

An efficient air cleaner is an important factor in minimizing cylinder wear. The air cleaner should be inspected every two weeks and refilled when the oil becomes thick or when a fourth of the oil is displaced by sediment.

Experience has shown that if the oil field pumping engine is operated at excessive speeds, high repair cost may be expected. It has been found that the piston speed should be kept below 800 feet per minute. The maximum recommended rpm for any engine may then be determined as follows—using 800 feet per minute piston speed as a basis,

$$\text{engine rpm} = \frac{4800}{\text{stroke, in.}}$$

For instance, an engine with a four-inch stroke will be running 1200 rpm with a piston speed of 800 feet per minute.

The lowest recommended operating speed depends on the design of the engine—if the engine is designed for relatively high speed, excessive vibration may occur at low speeds. Further, the oil pressure may fall to a dangerously low point at low speeds. The recommendation of the engine manufacturer should be followed but it has been found that speeds below 400 feet per minute piston speed promote sludging.

One of the most important rules to follow in the care of engines is to keep the well in proper balance to prevent excessive loads on engines. Counterbalance of a well may be checked by "slipping" the clutch on the engine with the pumping unit running at normal speed. If the well pulls equally on the up and downstroke of the rods, that is, if the speed decreases an equal amount on the up and downstroke, the well is properly counterbalanced. If it "slips" the clutch on the downstroke and not on the upstroke, the well is over-counterbalanced. If it "slips" the clutch on the upstroke and not on the downstroke, it is underbalanced. "Slipping" the clutch gives a very simple and easy method of checking the counterbalance. If the well is considerably out of balance, it is possible to observe the crank slow-down and speed-up without "slipping" the clutch.

It is sometimes beneficial to obtain a record which will show if the well is properly balanced. This may be obtained by the use of a hand tachograph. The tachometer chart is obtained on the flywheel or clutch shaft of the prime mover and records the fluctuation in speed due to the variation in belt pull, which is directly proportional to the condition of counterbalance. Tachometer records are shown in Figure 8. The upper tachometer record was taken from a well that was not properly counterbalanced. The distance between the check marks represents one complete cycle. If the well had been counterbalanced, an intermediate peak equal in height to those marked would have appeared. After installing additional beam weights, the lower tachometer record was obtained. It will be noted that two peaks per well cycle of approximately the same magnitude now occur, indicating the well is properly counterbalanced.

TABLE 1

Recommended Lubricating Oil for Use in Multicylinder Pumping Engines

Grade	10	20	30	40
Gravity, API	29.0	28.4	28.0	27.6
Pour, °F	-0	0	0	0
Flash, O.C. °F	385	410	445	460
Fire, O.C., °F	450	465	515	525
Viscosity, SUV.:				
100 °F	168	293	530	690
130 °F	91	141	233	293
210 °F	44	51	64	72
Viscosity Index	96	97	98	98
Color, N.P.A.	2.0	3.0	3.75	4.0
Carbon Residue, %	0.01	0.05	0.19	0.20
Neutralization No.	0.05	0.03	0.03	0.03
S.A.E. Vis. No.	10	20	30	40

Maintenance of Multi-Cylinder Pumping Engine

Maintenance need not be stressed as much as care since the frequency and extent of repairs will depend on how much care has been given the engine. However, the engine cannot be expected to operate trouble-free, and some systematic maintenance program should be adopted. A well-trained mechanic can be depended upon to perform specific repair jobs, but a general program of proper maintenance will include routine inspections, installation of a well-equipped repair shop, and the use of records showing oil consumption and repairs.

The pumper may become so proficient in the operation of an engine that he is able to locate the source of trouble. A service chart as presented in Figure 9

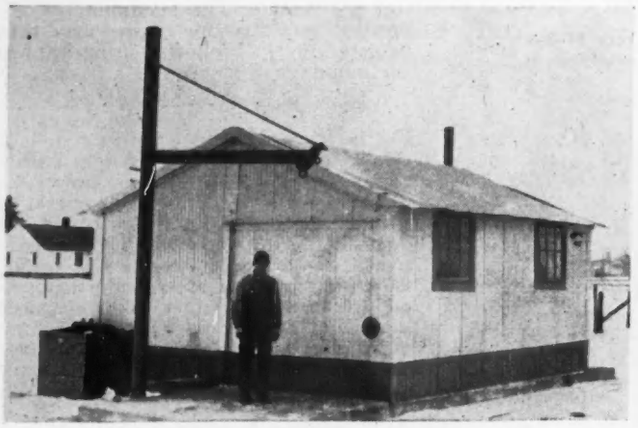

FIGURE 11

Mechanic's Work Shop Engines removed from truck bed by use of mast, trolley and hoist and placed on cart and rolled into house for overhaul.

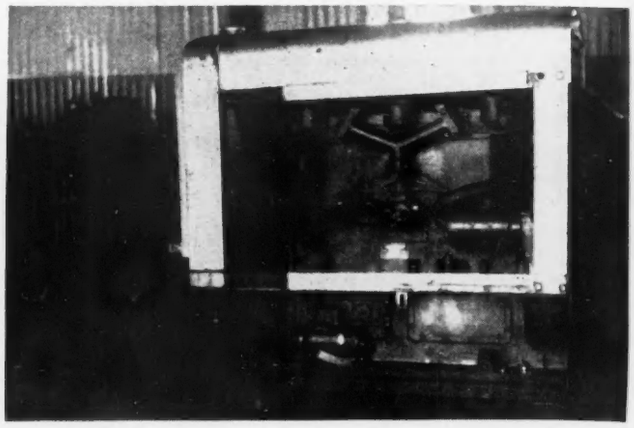

FIGURE 12

Engine to be overhauled is unloaded from truck directly onto small cart and pulled into workshop for overhauling.

may be of some benefit to him. However, the pumper usually does not have the time to repair the engine and has not been properly trained for the job. He should make only minor emergency repairs and leave other repairs to the field mechanic. Trouble should be reported promptly to the foreman. It is believed that most pumpers can change defective wiring, replace safety switches, magneto, water pumps, fan belts, spark plugs, etc., and a supply of these parts should be available on the lease or nearby.

Routine Engine Inspections

Major overhaul jobs often may be prevented by "catching the small jobs" before they become serious and thus apply the adage "a stitch in time saves nine." If routine inspections can be made at least every six months by the field mechanic or repairman, many major overhaul jobs could be averted. An example of an inspection sheet is shown in Figure 10. It will be noted that the operating speed of the engine, well cycle, counterbalance condition and amount of counterbalance was obtained in addition to the condition of the engine electric system, cooling system, safety switches, bearings, clutch, valves, oiling system and fuel system. The results of the inspection should be furnished the pumper who could make the minor repairs. Actually, the mechanic or repairman should make many of the necessary repairs at the time of the inspection. It may seem that these routine inspections would not be necessary if the pumper took proper care of the engine—and indeed, they might not be. It should be remembered, however, that the pumper is required to perform many other duties and he may neglect the engine to perform jobs which he may feel are more urgent. The assistance of a repairman or a mechanic at six-month intervals would be welcomed.

The frequency of overhaul jobs depends, to a large extent, on the skill and judgment of the mechanic; not only in diagnosing and performing minor repair jobs but also in deciding just when an overhaul job is necessary. A re-ring job may place an engine in good running order when it appeared that an overhaul job was necessary. There may be a tendency on the part of the mechanic to replace slightly worn parts when an overhaul job is being made in order that the engine will operate for some time without repair. This, no doubt, is a good practice but maximum service is not obtained from the various parts, making the decision as to when to overhaul an engine even more important.

If an engine has cylinder wear in excess of 0.010 inch, it is usually considered advisable to replace sleeves or rebore the cylinders. Also, exceedingly low oil pressure may reveal the necessity of an overhaul job.

Work Shop

When there are a number of engines in operation in one area, consideration should be given to the installation of a work shop for the field mechanic. No attempt should be made to overhaul an engine at the well. Among the objections are that many engines are not housed and working conditions are poor, proper tools are not available, dirt may accumulate on the parts, the engine cannot be properly tested, etc. A spare engine should always be available for installation on the well so that the overhaul job need not be "rushed." Further, when valves are bad, it has become common practice to replace the complete head with a reconditioned one and the necessary repairs are made to the valves in the shop at a later date. Photographs of a mechanic's work shop in Michigan is shown in Figures 11, 12 and 13. All engine overhaul jobs are made in this shop as well as semi-major jobs on clutches, heads, pumping-unit parts, etc.

To permit a satisfactory engine overhaul job, the following equipment was installed in the work shop:

Valve refacer
Valve-seat grinder
Vise
6-inch heavy-duty bench grinder
Anvil
Welding outfit
Stationary work bench
Carts and movable work bench

In addition to the above, some means must be provided for properly testing the engine after the job is completed.

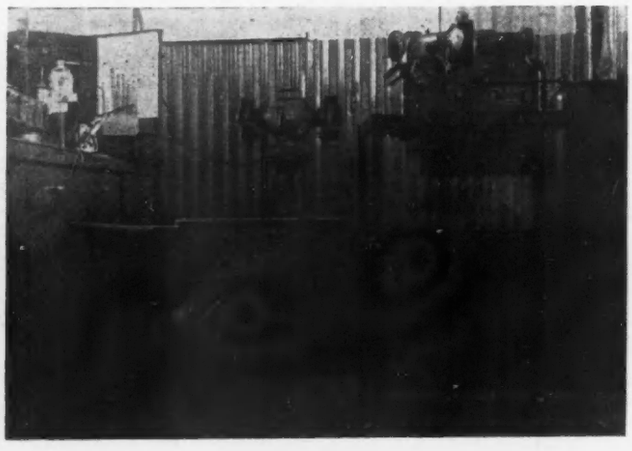

FIGURE 13

View of portion of work shop, showing work bench, valve refacer, valve-seat grinder on portable bench, anvil.

Records

Records of oil consumption and repair jobs play a very important role in the care and maintenance of engines. When the quantity of oil consumed is shown to be excessive, the engine is given a thorough inspection. It may be necessary to re-ring the engine, make a complete overhaul, or simply stop oil leaks. The hours operated monthly may be indicated on this record and thus afford an accurate record of service.

Each time a fan belt, magneto, etc., is replaced or any type of repairs made, the pumper, foreman or mechanic should be requested to make out a repair job sheet, showing the date, parts installed and removed, labor involved and remarks as to the type of trouble, cause and other pertinent information. These job sheets may be filed or posted in a book by individual wells and thus, a running record kept of repairs. A review of these records from time to time may indicate the need for special attention to individual parts such as magnetos, pumps on any particular type of engine, etc. If repairs become too frequent, a check of the load, speed, well balance, or other operating conditions may be indicated.

Rollers Roll—

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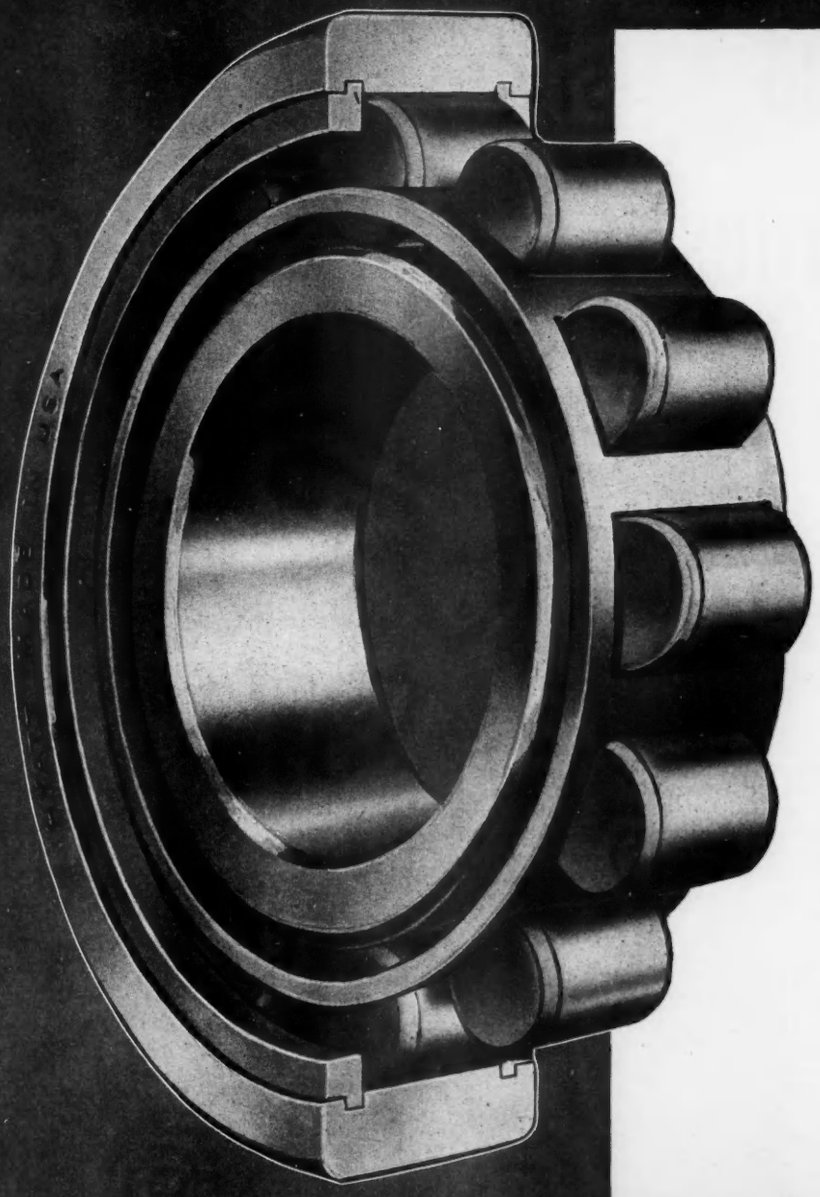

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Formation Penetrating With Shaped Explosive Charges

By ROBERT H. McLEMORE
Well Explosives, Incorporated, Fort Worth

FIGURE 1
Steel targets, 3¼ inches in length, shown with unshaped charge on the left, shaped charge on the right.

THE use of high explosives has long been recognized as a valuable aid in opening fissures and breaking down tight sands in order to secure increased production. A new method is now in the final development stage which should add greatly to the potentialities of high explosives as an agent for higher potentials and greater ultimate production.

Exhaustive surface tests under simulated well conditions, followed by actual tests in producing oil wells, have proved that penetration of considerable distances into predetermined points within the well bore can be secured by very small explosive charges, and that this penetration definitely does open channels which results in increased production.

The process (patent pending) is an application of the "hollow-head" or "shaped" charge to the problem of increasing the permeability. By means of the "shaped" charge, the main force created is directed into an extremely high velocity jet instead of spreading out in all directions like an ordinary charge. This high velocity jet can be aimed accurately in any desired direction.

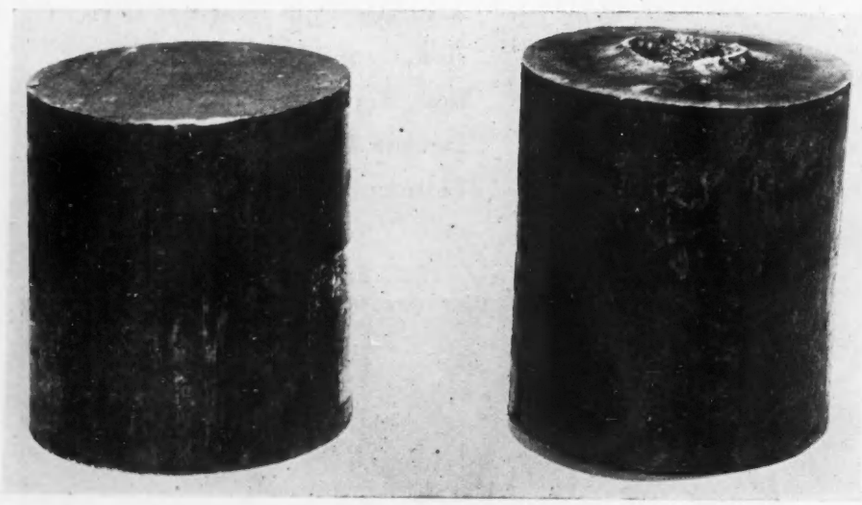


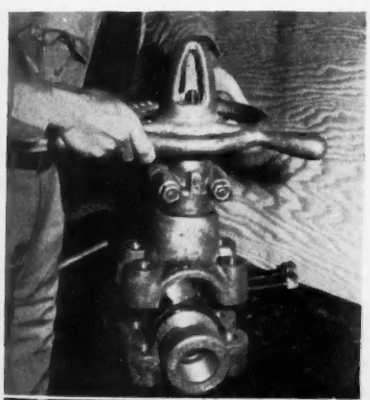
FIGURE 2
Steel targets after detonation. No indentation on target with unshaped charge. Shaped charge pierced the target completely.

Cavity Effects

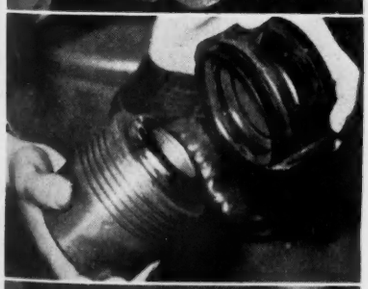
The charge is an adaptation of the techniques used by the Army during the war in the "bazooka" rockets and various other demolition charges. The principle of the "shaped" charge," often called the "cavity effect of explosives," consists of leaving a cavity in the explosive at the very spot where the maximum force is desired. In packing the explosive into the charge a cavity in the shape of a cone is left in the forward end of the charge. Upon detonation, the explosive force is focused in this cavity, and emerges as a high velocity stream of hot gases intermingled with fine particles of the material used in forming the cavity. In the formation penetrator this cavity is placed in the charge so that it will be adjacent to the formation at the point at which penetration is desired. The size and shape of the cavity, the material with which it is lined, and the type of explosive used, all have an effect on the penetration which will be attained.

Shown in Figure 1 are two explosive charges, one of them shaped and one unshaped; both placed on a steel target 3¼ inches in length, and both containing an equal amount of the same explosive. In Figure 2 the steel targets are shown after detonation. The unshaped charge made no indentation at all on the target. The shaped charge penetrated through the entire length of the target. The same results are obtained when the shots are fired under fluid. The energy from the unshaped charge

"REPAIR KIT" FOR CAMERON FLEX-SEALS



Release four body bolts and the upper body section with stem and bonnet assembly lifts off.



Hubs, which attach to body by interlocking shoulders and grooves, are easily removed.

Assemble new flow-way insert and wear rings between hubs and reassemble valve.

A Wrench and a Few Spare Parts Enables Any Rig Worker to Completely Overhaul a Cameron Flex-Seal Mud Line Valve

Even Cameron Flex-Seal Mud Line Valves, which require approximately 95% less maintenance by actual test than ordinary valves and stop cocks, will eventualy need a new flow-way insert, or a wear ring or some other part replacement. When that time comes you won't have to send the valve to a shop for repairs. Any roughneck can do the job . . . with ordinary rig tools.

Cameron Flex-Seal Mud Line Valves have won almost universal acceptance because they were designed for one and only one service: abrasive drilling fluid. Unlike ordinary valves, the Flex-Seal has no delicate metal-to-metal seats which frequently cut out under the high velocity flow of abrasive fluids. Instead, a molded rubber flow-way insert provides a pressure-tight seat for the gate and slowly absorbs the abrasive action of the fluid. When eventually worn out, the insert may be replaced quickly and easily at the rig.

Cameron Flex-Seal Mud Line Valves offer a number of unique mechanical features which are described and illustrated in the Composite Catalog, or literature will gladly be sent on request.

CAMERON IRON WORKS, INC.

711 MILBY ST., HOUSTON, TEXAS

Export: 74 Trinity Place, New York, N. Y. *Oklahoma:* 310 Thompson Bldg., Tulsa. *California:* H. G. (Jeff) Musolf, Los Angeles (Kimball 1281), Long Beach (6-68387).

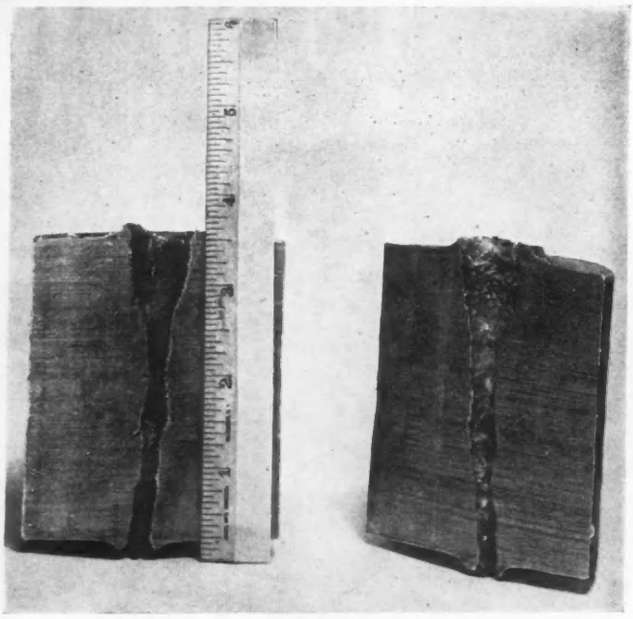


FIGURE 3

Cutaway view of pierced target. Composition of targets is 1040 steel.

is equally distributed in all directions, and, of course, compresses those substances within its shock range which are the most compressible. The shaped charge with its directionalized high velocity jet penetrates into the material at which it is aimed, regardless of its surrounding media. In Figure 3 is shown a longitudinal cross-section of the same pierced target of Figure 2, in which the path of energy from the shaped charge can be seen readily. Had the target been a concrete slab it would have been penetrated 12 to 16 inches. Had it been sandstone or limestone it would have been penetrated 12 to 22 inches.

Firing the Charge

The charges are lowered into the well on a conductor cable from a reel and measuring device on the surface. They are assembled on a hangar, in a series of ten or less, with each charge pointed in any desired relative position, so that an equal distribution of penetrations around the periphery of the bore may be secured. Each charge is equipped to be fired electrically from the surface, and the entire series is detonated simultaneously. Since the entire series of charges contains only a few pounds of explosives, it is not necessary that the hole be filled with fluid to prevent rupturing of the casing. The metal containers for the charges, together with the hangar assembly, are completely disintegrated, and only the electrical conductor cable is retrieved from the hole. There is no possibility of any foreign material being left in the hole of a size large enough to cause the necessity of a fishing job. The method of electrical firing gives a positive detonation, and relieves any possibility of the charges being detonated in the casing due to delayed action of the firing mechanism. The small charges, each containing less than a pound of explosive, securely packed in metal containers, are entirely safe if handled with reasonable care.

In Figure 4 is shown a diagrammatic sketch of the charges being detonated in the well, indicating the action of the explosive energy in making the formation penetration through the area of low permeability.

The charge is contained in a pressure-tight metal container, approximately 2½ inches in a diameter, and short enough to be lowered through the casing in a horizontal position. The design of the shaped charge is such that the normal shock and compressional wave pattern secured by conventional high explosive charges in a cylindrical bore hole are replaced by a highly irregular pattern, which is conducive to the creation of fissures and breakage within the formation, in the immediate vicinity of the charge, in addition to the actual penetration secured from the effect of the explosive jet.

Tests Favorable

The results obtained from tests made in actual producing wells have been favorable in every instance. These tests, all of which were made in low production, stripper-type wells, in which a clogged, congested sand condition was believed to be the cause of the decreased production, have secured and maintained a substantially increased productivity rate. Since the charges can be placed at any desired point, it is possible to stay above the oil-water contact and penetrate only into the oil-bearing zones. By the same token, the penetration can be placed above or below the oil-gas contact, in order to encourage or discourage the gas production, as the occasion demands.

Since the charges are small, the penetration may be made immediately below the casing, with no danger of rupturing, thus opening sand faces that otherwise would have been completely shut off. Although the work performed to date with the formation penetrator has been entirely of the nature of improving secondary recovery by establishing channels in congested sand conditions, it is believed that there are many other applications which will prove to be of equal value, though possibly not of such widespread interest. The penetration of cement or plastic material, which may have entered the producing formation as a result of squeeze jobs, thus shutting off all or part of a producing zone, can be accomplished, giving penetration 12 or more inches back into the formation without danger of rupturing the cementing material and destroying the effects of the water shut-off. Along these same lines, the penetration of the formation at the oil-gas contact or the oil-water contact, preparatory to cementing, can be accomplished, thus facilitating the entrance of the cement into the formation, and permitting a better water or gas shut-off. The use of the process as an aid to better, more effective acidizing jobs has great potentialities. Penetrations placed selectively in the formation previous to acidizing will facilitate the entrance of the acid at a considerable distance from the walls of the hole, resulting in a large drainage area.

Much has been written about the need for a method of increasing the secondary recovery of oil. It is well known that many fields have produced a small part of the total oil in place. It is believed that, with a process such as this, much of this oil will eventually be recovered, at an economical rate.

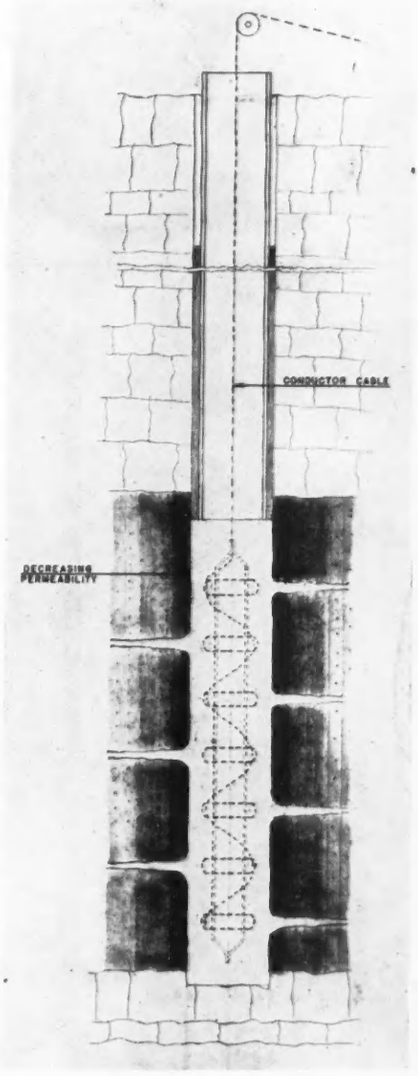


FIGURE 4

Diagrammatic sketch of penetrating action of explosive jet from shaped charge.

Patent Roundup

A Regular Feature of THE OIL WEEKLY

In this column are reviewed patents dealing with drilling, producing and pipe line branches of the oil industry that are issued by the United States Patent Office.

Patents recently issued by the United States Patent Office, Washington, D. C., include those listed below.

Printed copies of the patents listed are furnished by the Patent Office for 10 cents per copy and can be had by addressing the Commissioner of Patents, Washington 25, D. C.

Well Logging Apparatus

Gustave E. Archie, Houston, created this method (No. 2,400,678) and assigned the patent to Shell Development Company, San Francisco.

The method determines the salinity of liquid in the formations traversed by the borehole of a well not containing an electrically conductive liquid by suspending a container having a number of confined electrolytic materials, each having different calibrated electrolytic properties which cause a number of spontaneous potentials to be created. This is accomplished by establishing a liquid junction between each of the electrolyte bodies and the formation liquid and simultaneously and separately recording the potentials, thereby determining the salinity of the formation liquid by comparing the values of the spontaneous potentials.

Emulsion Treatment

This method of electric treating of emulsions (No. 2,400,975) was devised by Paul H. Brace, Mount Pleasant, Mich., and assigned to Petrolite Corporation, Ltd., Wilmington, Del.

The apparatus consists of a tank, of upper and lower annular interstitial electrodes which provide a throat, the electrodes being spaced to define an annular treating space and submerged in a fluid inside the tank. The oil-in-water emulsion is pumped from heating containers by a distributing pipe near the center of the annular space, and is discharged outwardly along the treating space so as to be drawn by pumping the fluid in the tank from a zone above the upper electrode and below the lower electrode through the throats. The pumped fluid enters the space between a pair of annular plates coaxial with the emulsion distributing pipe through the central openings of these plates and flows outwardly into the annular treating space with the emulsion. Electric fields set up between the annular plates and in the annular treating space separate the positive and negative molecules of oil and water.

Scale Remover, Corrosion Preventer

Ual J. Brown of Oklahoma City, has obtained this patent, No. 2,401,546.

The device is attached to the lower element of well operating equipment submerged in well fluid. It consists of a copper barrel inside of which is hung a hollow zinc bar pivoted at both ends by small holding rods. The annular space between rod and barrel is filled with fluid. The connection between copper and zinc sets up the electrolysis necessary to prevent scale and corrosion, by acting on the liquid.

Well Screen

This device (No. 2,401,035) has been patented by Swan M. Akeyson and Ward L. Stockham of Long Beach, Calif., and assigned to Nobs Chemical Company, Los Angeles.

The screen is made of a fluid passing medium having apertures closed by a solid substantially oil and water insoluble material of metallic carbonate which will disintegrate under acid to open the screen aperatures. A binding substance, in the presence of water expands the material within the apertures.

Apparatus for Well Logging

This well surveying device (No. 2,398,562) has been patented by William L. Russell, Tulsa, and is unassigned.

The device records characteristics of formations crossed by a bore hole and consists of a caliper tool to be lowered into a well and having pairs of adjoining arms mounted for independent movement in radial planes extending through the axis of the bore hole. The arms have blunt and sharp contacts, respectively, which are adapted to contact continguous areas of the wall of the well and engage the surface of the formations. A mechanism is connected with the arms to record their relative movements.

Flexible Pipe Section

John A. Zublin, Los Angeles, has received a patent (No. 2,402,003) for this invention, which is unassigned.

The flexible pipe section or joint is made up of a resilient metal tube with intermediate slots to give flexibility and a lining of unperforated flexible material that bridges the slotted portion of the tube. An interlocking element extends through the lining and tube over an area sufficient to create a hermitic seal adjacent to the ends.

Well Drilling Apparatus

This tool for well drilling (No. 2,400,853) has been patented by Walter P. Stilley, Newcastle, Texas, and is unassigned.

The drill is composed of a body, partly cylindrical, with a head mounted in the lower end of this portion and a disc mounted above the head. Several bits have stems slidably mounted in the head and disc, each of the stems having a spring connection tending to pull the stem upward and having a tappet roller. An impeller is mounted in the body for rotating and has a means of engaging and actuating the tappet rollers of the stems. This actuating means consists of some rows of cams on the under face of the impeller, the cams of one row being aligned radially with the cams of another row in position to bear upon the tappet rollers. The stems of the bit blades are also arranged in circumferential rows radially spaced from each other, with the stems of one row staggered relative to the stems of the other row for alternate engagement and actuation by the cams.

Sealing Material

The patent on this material (No. 2,398,347) has been taken out by Francis M. Anderson, Duncan, Okla., and assigned to Halliburton Oil Well Cementing Company, Duncan.

This composition is for use in drilling oil wells or the like and consists of drilling mud containing pulverized or powdered feathers in a quantity of 0.25 percent by weight or more, the amount being sufficient to retard the flow of mud into porous or fissured structures.

Fluid Seal Off

A method of selectively sealing off the flow of water or gas through undesirable fluid-passing porous rigid sand formations exposed to an oil well without plugging desirable porous oil-producing strata also exposed to the well (No. 2,402,588) has been patented by Kurt H. Andresen, Bradford, Penn., and assigned to Essex Royalty Corporation, New York.

A solution of sodium silicate of such dilute concentration that variation of the pH of the solution through practically the entire range causes a variation in the setting time of the silicic acid gel is introduced by a mechanism under conditions of such slow controlled flow that the solution enters the more permeable strata to be plugged to the exclusion of the less permeable strata. Carbon dioxide gas is flowed into the well, also slowly, so that it enters selectively the pores of the more permeable strata filled with the gel and lowers the pH value. This maintains the treated solution in place in the pores until the solution forms a fluid silicic acid gel of sufficient viscosity and depth to act as a permanent barrier to the flow of fluid through the formation.

Rotary Well Bore Cleaner

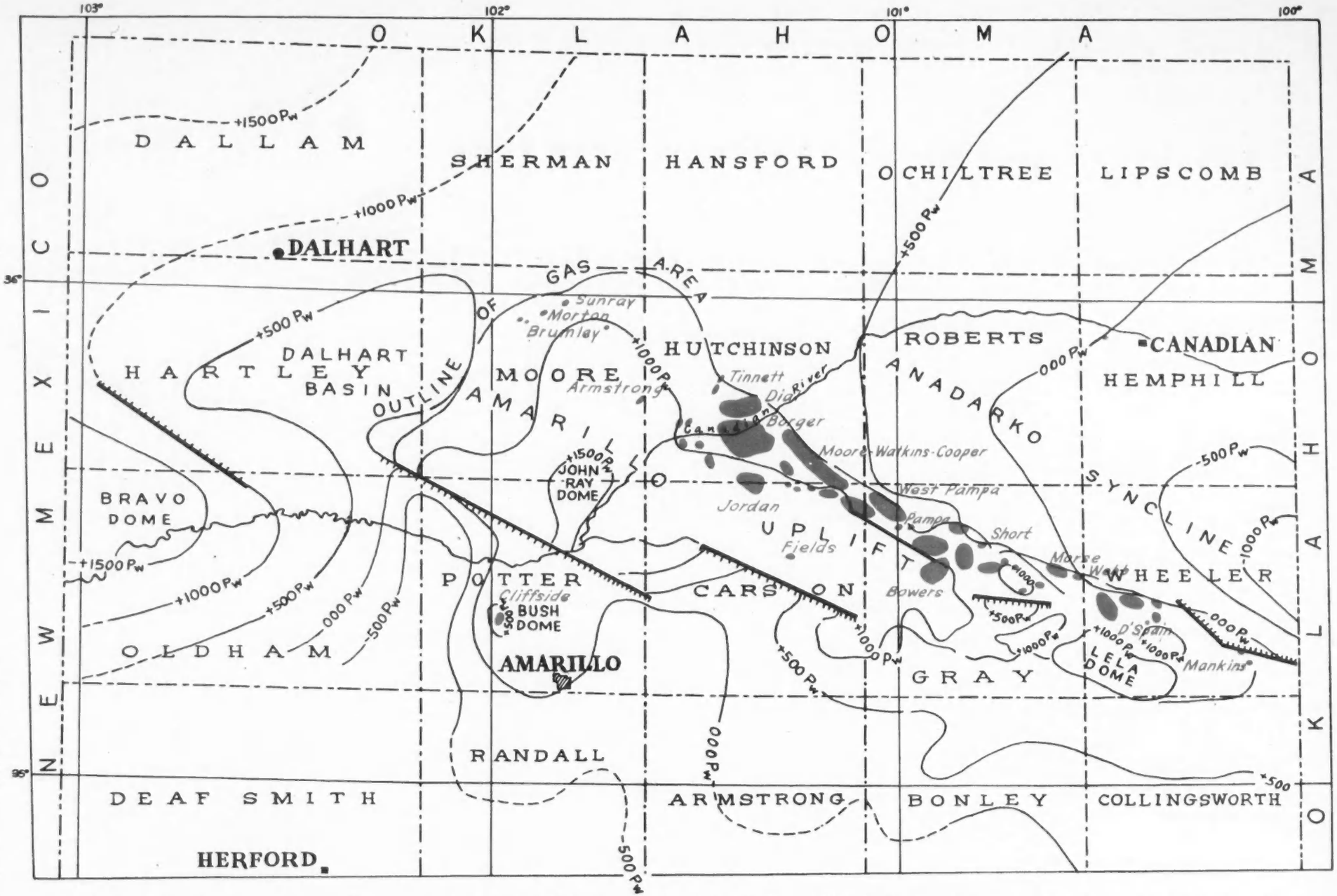
Kenneth A. Wright, Los Angeles, has assigned this patent (No. 2,402,223) to B and W, Inc., Long Beach, Calif.

A body of rubber is attached to an elongated operating tool lowered into the casing, or the like. A straight elongated blade is carried by and projects substantially radially outward from the body to extend parallel with the operating tool. The body and the blade normally project a substantial distance from the tool to which the body is applied, the body being so arranged that it may be circumferentially folded inward by a surrounding medium when in a well to position the blade inwardly of its normal position.

Piston Packing

Dallas M. Smith, Kirkwood, Mo., has assigned this spacer for use in piston packing (No. 2,402,783) to McQuay-Norris Manufacturing Company, St. Louis.

The spacer is adapted to maintain piston rings in predetermined position in a piston ring groove. The spacer is formed of ribbon steel and shaped to provide flat portions and substantially square rigid U-shaped portions between the rings and grooves.



Map showing the location of some of the most important oil and gas fields of the Southwest developed along the Amarillo Uplift in the Texas Panhandle, major geological feature that adjoins the big Anadarko Basin Syncline where current and future drilling may result in the development of important oil and gas reserves.

The Anadarko Basin . . .

WILL IT PAY OFF?

By DR. CHARLES N. GOULD, Geologist
Norman, Oklahoma

IN THE light of pending developments in Western Oklahoma the question naturally arises: "Will large quantities of oil and gas be found in the Anadarko Basin?"

Since it is known that I have devoted many years to geological work in that part of the state as well as in the Panhandle oil and gas area it is natural that my opinion has been asked as to the productive possibilities of the now well-known structural feature which apparently is about to be tested on a comparatively large scale. As a scientist I must answer that question with a frank "I do not know." I do not, however, imply that prospects are less good because of the caution which, from past experience, I have learned to exercise in the face of such queries.

The oil operator who plans to spend considerable money prospecting for oil and gas in the Anadarko Basin is entitled to know certain facts and perhaps the best answer to his question is to point out that oil and gas has actually been known to exist in the Anadarko Basin for more than 40 years.

In 1901 I visited some shallow oil wells which had been drilled a few miles northwest of Granite, Okla. A small amount of oil was being produced and brought to the surface with a rope and bucket. These wells were but a short distance north of the outcrop of the granite on Headquarters Mountain, one of the westernmost peaks of the Wichita Mountains.

The Gotebo field ten miles north of the Wichita Mountains was opened in 1908, and in 1916 the first well was drilled in the Cement field. Six years later the Sayre field was opened.

It must be remembered that these fields and others were producing oil and gas several years before the Anadarko Basin was known to exist. The presence and location of this great structural trough north of the Wichita Mountains had been suspected by several Oklahoma geologists, notably Frank Green and J. V. Howell, but the name was not published until 1924.

Optimistic Concensus

Since the Anadarko Basin was first officially recognized and brought to general attention, geological opinion has undergone a gradual change. At present the concensus of those best able to speak with authority is almost unanimous in that large oil fields may be expected to be tapped in the Basin, both in Western Oklahoma and the Panhandle. The arguments upon which this belief is predicated are as follows:

1. The structure of the Basin is similar to those in Illinois, Michigan, West Texas and other states where many important fields have been discovered.

2. The rocks in the Anadarko Basin appear to be similar to those in other basins which are known to form source beds for the various hydrocarbons.

3. The Anadarko Basin is practically surrounded by producing oil and gas fields; namely, the Panhandle fields on the south, the Hugoton gas area of Kansas, and the Oklahoma Panhandle on the west, and the Central Oklahoma fields along the Nemaha Ridge on the east.

This article should be read in conjunction with the map on opposite page.

It is significant that many oil and gas fields are producing continguous to the Basin including more than 30 in Texas and perhaps half as many in Oklahoma. At the moment, geologists and oil men in general are "sitting on edge" with their ears glued to the telephone expecting to receive the word at any moment that the "Big Field" has finally been found in the Anadarko Basin of Oklahoma.

From both prospective oil producing and academic standpoints the Anadarko Basin is rapidly becoming one of the most interesting structures in the Southwest and the question has frequently been asked as to why the geologist failed to recognize its existence at the time the surface geology of the Panhandle was determined during the first decade of the century. There are at least three good reasons which can be advanced for failure to earlier recognize this important synclinal feature:

1. The structure is so large that it is not easy to distinguish.

2. The entire Panhandle country is covered by a blanket of so-called "Tertiary" beds that conceal the underlying rocks, which are exposed on the surface only in the deeper stream valleys such as Palo Duro Canyon and the valley of the Canadian River.

3. The presence of the great structural trough in Oklahoma and the Texas Panhandle was not suspected.

Much more is known about the Anadarko Basin today than was known 20 or even 10 years ago; but there are still some important questions that remain unanswered. Most geologists believe that the Ardmore Basin south of the Arbuckle Mountains is continuous with the south end of the Anadarko Basin. These men would include the Criner Hills, the Wichita Mountains, and the buried Amarillo Uplift as a single more-or-less continuous range.

The location of the west end of the Anadarko Basin is still undetermined. At times the controversy over this problem has been spirited. Many, perhaps most, geologists would place it in Hutchinson County, Texas. But there are those who believe that the Basin splits, one branch extending north toward Kansas, the other into New Mexico.

Extent of Basin

Another moot question is the extent of the Basin to the north in Oklahoma. It is universally agreed that the south limb is relatively short and dips comparatively steeply off the north flank of the Wichita and Amarillo Mountains. But the dips on the north limb of the Basin are very gentle and extend for many miles. There are some geologists who would place the north rim of the Basin near the Canadian River in Canadian, Blaine and Dewey counties, while others would extend it to the Cimarron or even to the Kansas line.

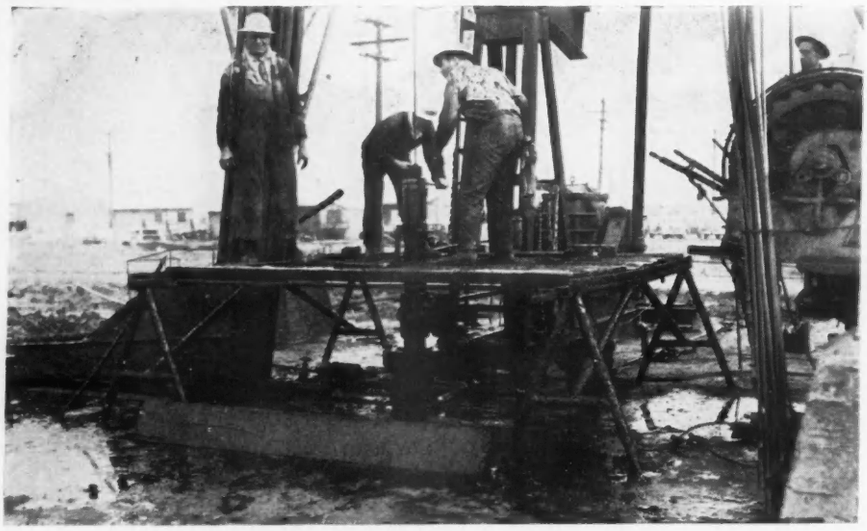
This appears to be one of those problems for which, in the light of our present knowledge, there can be no definite answer, and concerning which there may always be an honest difference of opinion.

The time of the shaping of the Basin is also a matter for discussion, but practically all geologists agree that the deformation has been progressive and may possibly still be going on.

As in the case of the Panhandle oil and gas field, which is contiguous to the Anadarko Basin syncline, it appears that the time has arrived for the practical application of scientific research and only by extensive exploration can the potential possibilities be proved. The development of the Panhandle field was slow and as late as 1923 a leading geologist declared in an article entitled, "Oil and Gas in the Texas Panhandle," that it would pay to "think twice before investing there at present." But more and more wells were drilled until oil has been found in some 35 localities, chiefly along the north flank of the Amarillo Arch and the Anadarko Basin.

PRODUCTION HINTS

Elevated Pulling Platform is Safe and Easy to Assemble

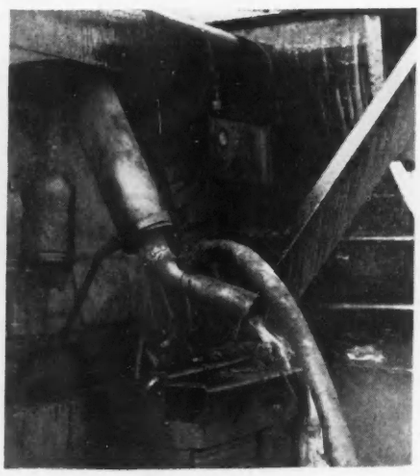


WELL SERVICING

By the time line wiper and pressure fittings are installed on the tubing head preparatory to pulling a well that still heads occasionally, the fittings are so high above the floor that some type of elevated platform must be built up around it to enable the crew to work properly. This rigging up of platforms takes up much of the crew's time ordinarily, but the unitized light framework designed by one company eliminates much of this extra work and provides maximum floor space for the crew to stand on.

The rack consists of two A-frame structures, one set on either side of the well head and on each of which is welded a long length of angle iron. Planks then are laid against these angle irons, their lengths running at right angles to the horse sections as shown. Holding the two horses positioned during the job is accomplished by hooking a long steel rod link into each side, thus preventing the horses from skidding to allow planking to fall apart. Disassembling and elevated platform only involves removing the two retainer bars and loading planks and the two horses.

Water Cooling Device Cuts Pulling Unit Engine Fire Hazard



EXHAUST CONTROL

Following a fire in which at least one man was fatally injured and which apparently was caused by ignition of crude oil spray or gas by the pulling unit engine exhaust, one company now takes the precaution of attaching a water hose to the end of the exhaust manifold when excessive oil or gas begins to accumulate around the equipment. Little change was made on the existing equipment, it being necessary only to weld a short pipe nipple to the exhaust line three to four inches down stream from the manifold housing. Exhaust blast effectively atomizes the stream of water and any live sparks or heated carbon particles are quenched before they leave the exhaust line.

Water Supply Setting

WATER SYSTEMS

One pipe-line company has solved many of the problems connected with make-up water for the cooling system of the gas engines used to power the field and smaller line stations. Instead of mounting the storage drum on the engine or pump skid, the drum is buried adjacent to the unit, with a line connected to the radiator overflow line so that any excess may drain back and be caught.

The unit is equipped with a small pump, driven from the fan belt pulley, which may be used to draw water from the sump instead of the radiator, pumping through the engine system and draining back to the sump, so as to permit thorough flushing of the radiator. This same pump, normally disengaged from its drive, may be used to transfer make-up water from the reserve supply to the engine cooling system, the unit being run until a steady stream through the radiator overflow indicates that the system is filled.

The buried drum, being practically enclosed by earth, maintains a uniform temperature. Evaporation in summer is less than from an elevated unit. During cold weather, when the elevated drum would be exposed to freezing, the buried water supply remains well above the ice point, insuring ample make-up when required.

A close-fitting lid, provided with ears which engage the edge of the drum and equipped with hasp and lock to prevent tampering, prevents accidents and also keeps trash and insects out of the water. A small vent allows vapors to escape, and allows the water to be withdrawn by the pump.

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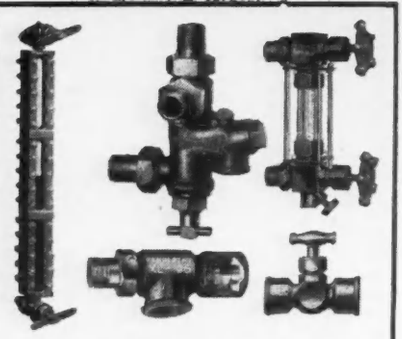

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See Pages 2450 to 2455, Composite Catalog

PENBERTHY INJECTOR CO.
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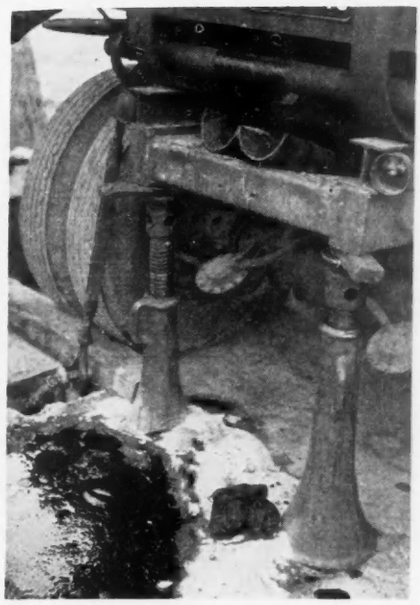
PRODUCTION HINTS

Jack Racks Save Time and Money

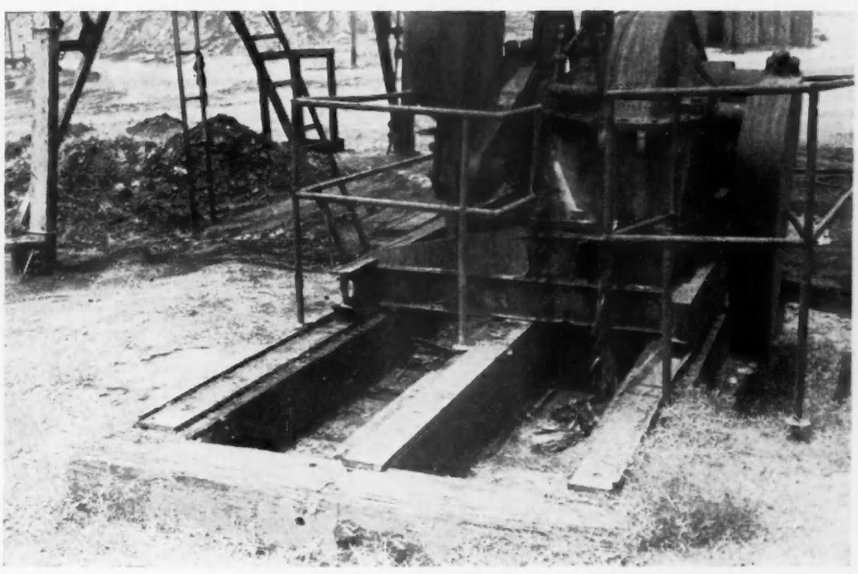


Facilitating rigging up of the pulling unit on relatively shallow wells, one operator utilizes a cross-bar and turnbuckle tie-down and a pair of builder's screw jacks to support the unit, a pair of open receptacles being provided at the rear of the unit for holding the jacks when they are not in use. Eliminating precise spotting of the truck, the horizontal pipe bar can be run through the skid base members any distance or until the anchoring turnbuckles are properly attached. Lateral, as well as fore-and-aft, adjustment is easily compensated for in this type of tie-down.

JACK RACKS

In the center of the truck frame at the rear are mounted two half-sections of 6-inch casing which has been split open longitudinally. Welded together as shown, they slope steeply toward the front of the truck. Upon completion of a job, the two jacks are racked easily in these readily accessible receptacles, their weight and the slant of the pipe making it unlikely that they will jump out during normal travel about the lease.

Grooved Tracks Permit Skidding Pumping Unit



In order to facilitate pulling rods and tubing on wells where the pumping units are too close to the casing head for efficient work by the pulling crew, use may be made of a beneficial practice followed by one major company. The timbered foundation on which the skid-based unit rests was provided with twin grooves made of planking along which the unit could be skidded if desired in order to facilitate pulling operations.

FOUNDATIONS

The few minutes required to move the unit back are more than made up in the saving of time realized through the unrestricted movement of men working around the well head during the pulling job.

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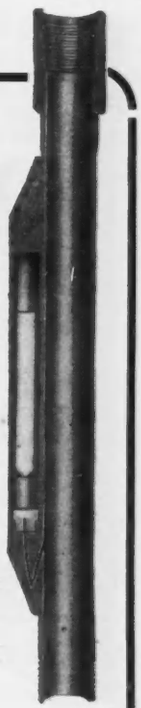

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Both Production and Crude Runs Show Slight Gains for the Week

United States production of crude oil increased by the small amount of 7000 barrels daily over the previous week in averaging 4,957,000 daily for the week ended June 29, the American Petroleum Institute's latest weekly statistical report showed. At this level it was only 4000 barrels short of the all time peak of two weeks previously, and 54,000 barrels a day or 1.1 percent above the output in the corresponding week last year.

Crude runs to stills also increased and averaged 4,854,000 barrels daily in the week of June 29, up 18,000 from the week before. Although considerably under the record runs of 5,140,000 barrels daily in mid-August last year, the refinery throughput was but 195,000 daily or 3.9 percent less than in the week ended June 30 last year.

With production substantially above runs to stills, crude oil stocks increased 2,087,000 barrels in the week ended June 22, the U. S. Bureau of Mines reported. They then totaled 222,193,000 barrels, an amount 1,219,000 barrels greater than that of 220,974,000 barrels held a year previously.

Gasoline production, including natural blended at refineries, totaled 14,500,000 barrels during the week ended June 29, an increase of 229,000 barrels over the output in the previous week, although 902,000 barrels or 5.9 percent less than the 15,402,000 barrels produced in the week ended June 30, 1945.

Stocks of finished and unfinished gasoline were drawn down by 561,000 barrels during the week ended June 29, to the level of 92,333,000 barrels. That amount was, however, 6,188,000 barrels or 7.2 percent more than the 86,145,000 barrels held at the comparable date a year ago.

Distillate fuel oil production of 5,408,000 barrels for the week of June 29 was 184,000 less than in the previous week but 413,000 barrels or 8.3 percent more than the 4,995,000 barrels turned out at refineries in the like week last year. Stocks continued to increase seasonally by 1,342,000 barrels and rose to 37,762,000 barrels. That was 5,548,000 barrels or 17.2 percent more than the inventory of 32,214,000 barrels held June 30 last year. However, the increase over a year ago is desirable, because of the relatively high consumption expected during the coming fall, winter, and spring.

Residual fuel oil production totaled 8,828,000 barrels during the week and was 122,000 barrels greater than in the previous week, although 405,000 barrels or 4.4 percent less than the 9,233,000 barrels produced in the like week last year. Stocks of residual decreased by the small amount of 79,000 barrels and then totaled 46,447,000 barrels. That amount was 5,816,000 barrels or 14.3 percent more than the exceptionally small inventory of 40,631,000 barrels held June 30 last year, and the situation on residual stocks may be regarded as satisfactory, with demand continuing comparatively high.

Montana Divided

The state of Montana has been divided into two districts by the Board of Railroad Commissioners and Oil Conservation Board for the purposes of supervising the drilling of wells for oil and gas, the production and transportation of crude oil and gas, etc.

Fred C. Platt has been named chief supervisor of the Billings area and H. E. Warner is in charge of the Shelby District.

State Geologist Retires

Dr. R. A. Smith, who became the first and only assistant to the state geologist in 1911 and eight years later was appointed state geologist, will retire as head of the Michigan Geological Survey this summer. His successor has not been named. Smith was honored upon his retirement at a banquet in Mt. Pleasant June 28 sponsored by the Michigan Geological Society and the Michigan chapter of the American Petroleum Institute. He plans to do special lecture work at Michigan State College following his retirement.

P. J. Hoffmaster, director of the Department of Conservation, praised Smith as "an optimist who has lived by the creed that it is important to do any job well."

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod. Barrels Daily	Crude Oil Prod. Week Ended	Runs to Stills Barrels Daily	Runs to Stills Week Ended	Crude Stocks Barrels	Crude Stocks Week Ended	Gasoline Stocks Barrels	Gasoline Stocks Week Ended	Gasoil and Distillate Stocks Barrels	Gasoil and Distillate Stocks Week Ended	Residual Fuel Oil Stocks Barrels	Residual Fuel Oil Stocks Week Ended
Highs:												
1941	4,337	11-22	4,120	10-18	266,187	3-29	99,727	3-29	[1]54,983	11-15	102,448	1- 4
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	47,861	11-14	95,857	1- 8
1943	4,436	11-13	4,331	12- 4	245,752	5-29	94,159	3-20	47,187	11-27	72,881	1- 2
1944	4,762	9-30	4,798	12-30	240,992	1- 1	89,162	4- 1	48,162	10-28	64,744	10- 7
1945	4,944	7-21	[1]5,140	8-18	227,554	10-13	99,012	3-24	45,341	11-17	56,074	1- 6
1946	[1]4,961	6-15	4,857	5-25	229,430	3- 2	105,233	2-16	37,762	6-29	46,526	6-22
Lows:												
1939	[3]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 3
1941	3,364	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,382	4-12	90,914	7-13
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-18	232,191	1- 9	68,182	10-16	30,732	4- 3	57,596	12-25
1944	4,357	1- 1	4,228	2-12	220,258	9- 9	76,302	1- 1	30,232	4-19	49,737	3-18
1945	3,621	10- 6	3,409	10- 6	[4]211,813	8-25	70,791	10-13	26,483	3-17	38,548	5-26
1946	4,403	3- 9	4,498	1-12	218,193	1- 5	92,333	6-29	25,131	3- 9	37,289	4- 6

TRENDS OF 1945 AND 1946

Trends in Week Ended	Crude Oil Production Daily	Crude Oil Runs to Stills Daily	Crude Oil Stocks Week End	Gasoline Production Weekly	Gasoline Stocks Week End	Gasoil and Distillate Production Weekly	Gasoil and Distillate Stocks Week End	Residual Fuel Production Weekly	Residual Fuel Stocks Week End
1945:									
January 27	4,727	4,756	221,310	14,957	88,223	4,843	33,561	9,252	51,119
February 24	4,777	4,803	219,351	15,500	95,972	4,958	28,753	9,084	46,713
March 31	4,781	4,677	223,782	14,644	98,758	4,548	26,889	9,184	41,745
April 28	4,805	4,780	223,474	14,633	94,068	4,636	28,273	9,379	39,813
May 26	4,887	4,950	222,831	15,194	89,121	4,667	29,184	9,670	38,548
June 30	4,903	4,999	220,781	15,546	86,472	4,910	32,213	9,077	40,488
July 28	4,930	4,996	218,507	16,106	86,008	4,598	36,071	9,586	42,283
August 25	4,892	4,931	[4]211,813	15,986	84,693	4,960	39,782	9,356	46,201
September 29	4,357	3,812	222,387	11,913	79,552	3,940	43,689	7,047	46,853
October 27	4,273	4,838	224,230	15,530	74,335	5,159	43,472	8,691	45,943
November 24	4,469	4,648	219,363	15,681	83,184	4,802	45,258	8,800	47,474
December 29	4,474	4,729	218,918	14,546	95,205	5,055	36,651	8,765	42,447
1946:									
January 5	4,548	4,651	218,193	14,488	98,494	5,293	35,199	8,867	42,371
January 26	4,626	4,553	220,544	13,622	101,737	5,720	29,498	8,411	39,722
February 23	4,714	4,595	226,699	13,175	104,709	5,728	25,398	7,913	39,290
March 30	4,425	4,684	224,994	13,896	104,715	5,357	28,240	8,738	37,746
April 27	4,672	4,685	224,443	14,228	99,631	5,568	30,466	9,204	39,404
May 25	4,759	4,857	222,214	14,322	95,769	5,463	32,973	8,908	43,368
June 1	4,756	4,843	220,885	14,293	95,247	5,070	33,172	8,881	44,403
June 8	4,896	4,827	218,589	13,864	94,146	5,441	33,958	9,015	45,938
June 15	[1]4,961	4,799	220,106	14,510	93,449	5,447	35,582	8,931	45,915
June 22	4,950	4,836	222,193	14,271	92,894	5,592	36,420	8,706	46,526
June 29, 1946	4,957	4,854	.....	14,500	92,333	5,408	37,762	8,828	46,447
June 30, 1945	4,903	5,049	[5]220,974	15,402	86,145	4,995	32,214	9,233	40,631
Change:									
In Week	+7	+18	+2,087	+229	−561	−184	+1,342	+122	−79
In Year	+54	−195	+1,219	−902	+6,188	+413	+5,548	−405	+5,816
In Year	+1.1%	−3.9%	+0.6%	−5.9%	+7.2%	+8.3%	+17.2%	−4.4%	+14.3%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922 due to shutdown of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, June 23, 1945.

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☆ Oklahoma

Lindsay Well Has Big Flow; Okfuskee Gets New Gas Pool

Two Garvin County wildcats fail within a week; state shuts in Maysville pool discovery well; fourth producer for Southwest Antioch pool flows 633 barrels of oil in 6 hours; Lindsay well has big flow; Okfuskee County gets new gas pool; wildcat looms as pool opener in McClain County.

Garvin County: The two-county area of Garvin and McClain continued to hold the chief interest in Oklahoma drilling and is the state's most active area. The Antioch region of Garvin County, recently considered one of Oklahoma's most promising new oil areas, got its second disappointment within a week when British American Oil Company abandoned its Guthrie 1, NW NW SE 7-3n-2w, between the Southwest Antioch and Maysville areas. The first Bromide, found at 7275 feet, was dry; Sylvan topped at 6634 feet, and Viola lime at 6683 feet. The test ran low structurally. Earlier Mid-Continent Petroleum Corporation's Davenport (Young) 1, NE NE NW 28-4n-2w, northeast of the Guthrie well, was abandoned at a total depth of 6838 feet. Another Mid-Continent test in the area, the Menefee 1, SE SE SE 2-4n-2w, northeast of Maysville, was drilling at 6445 feet in shale, thus muffing rumors that this test also would be abandoned. On a drill stem test for 50 minutes in Pennsylvania sand from 5801-15 feet, gas showed in 45 minutes, and 50 feet of oil- and gas-cut mud was recovered.

The Oklahoma Corporation Commission has classified as a gas well and ordered shut in the R. H. Dearing & Sons' McBride et al 1, NE NW NW 30-4n-2w, discovery well of the Maysville field. Completed in April, the well a month later was killed to work over, with hopes of lowering the gas-oil ratio. Remedial work failed, and since shortly after completion the well has been on a 24-hour production. Latest test of the well showed a flow of 72 barrels of oil in 24 hours, with 1,721,000 feet of gas. Gas-oil ratio is 23,904 feet to 1. Dan O. Howard, State Conservation Department geologist, recommended the classification and shutting in of the well until pipelines can care for the production.

The fourth producer and perhaps the best well to date for the Southwest Antioch pool is Sinclair Prairie Oil Company's Ward 2, NW NW NW 29-3n-2w, which recently flowed 633 barrels of oil in six hours and 45 minutes, through a ½-inch choke. After 7-inch casing was run to the bottom at 6503 feet, total depth, pipe was perforated at 6436-58 feet, opposite the Pennsylvania sand, and the well was swabbed in. Production is from 6418-42 feet.

Lindsay Area: Cities Service Oil Company et al's Lawson B-1, C NE SW 22-5n-4w, in the North Lindsay pool of McClain County, showed for 84 barrels of oil per hour on a drill stem test with packer set at 11,110 feet. Crew is now drilling ahead from 11,184 feet, total depth. On the drill stem test, the tool was opened an hour and six minutes, with crew testing from total depth. Half-inch choke was used on the bottom, with ¾-inch choke on top. This apparently will be the fourth producer in the pool, which Cities Service opened in August, 1945. The Lawson-B is a southeast diagonal offset to the discovery well.

Okfuskee County: Possibility that a rich natural gas reserve exists northwest of Okemah and between the East Castle and Northwest Cary pools of south-central Okfuskee County has been indicated by a pool opener of the Wilcox Oil Company. The Callahan 1, SE SE NE 24-12n-9e, was drilled to the Hunton lime at 3668-88 feet, and a test produced 14,000,000 feet of gas a day, with initial rock pressure 1400 pounds. The discovery is on a block of 1000 acres of leases, which was assembled by a Tulsa independent.

McClain County: Opening of a gas-distillate pool southwest of Wayne townsite appears likely in Big Chief Drilling Company's Stephens 1, C SE SW 24-5n-2w. The wildcat is east of the Antioch-Lindsay area. On a drill stem test taken at 6534-53 feet, the well showed an estimated 4 million feet of gas and recovered 60 feet of distillate after it was deepened to 6566 feet where the basal Pennsylvanian sand was topped at 6506 feet. On a one-hour drill stem test at 6525-66 feet, 3.7 million feet of gas and 120 feet of distillate was recovered, with 1268 pounds bottom-hole pressure. Crew is drilling ahead at 6587 feet, as the well is contracted for the Wilcox-Bromide zone.

☆ Kansas

Pawnee County Wildcat Looms as Pool Opener

Herzog pool gets extension; Pawnee County wildcat looms as pool opener; state takes steps to curb flow of brine; Sohio stakes three wildcats in Western Kansas; attempt to extend Cunningham pool of Pratt County fails.

Ellis County: The Herzog pool of eastern Ellis County apparently has been extended by Wondra & Carston et al's Dreiling 1, SW SW SW 20-13s-16w. The well flowed 200 barrels of oil from 3485-96 feet, in the Arbuckle lime, and after

Wells Completed in the United States in Week Ended July 6, 1946

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second or third issue of each month. More detailed data on wildcats published in third or fourth issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Gas	†Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS *Oil	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	Cumulative: This Year	Last Year
Alabama												1	8	17
Arizona													1	
Arkansas	2				2		1		4	5	7	8	96	91
California	32	1		2	35	3			2	2	40	36	985	1,109
Colorado	1				1						1	8	65	13
Florida									1	1	1		12	9
Georgia													2	5
Illinois	32		2	11	45		1		11	12	57	57	1,048	875
Indiana	5				5		1		2	3	8	4	216	161
Iowa														1
Kansas	12	1		7	20	4			8	8	32	48	1,045	817
Kentucky	3			4	7				2	2	9	12	283	243
Louisiana	12	1		2	15		3	1		4	19	30	648	514
North Louisiana	9	1		2	12			1		1	13	20	347	171
South Louisiana	3				3		3			3	6	10	301	343
Michigan												18	368	386
Mississippi	1				1				3	3	4	7	122	195
Missouri													12	23
Montana	2			2	4						4	12	128	103
Nebraska														3
New Mexico	1	1			2				5	5	7	7	207	232
New York	15		10		25						25	25	562	545
Ohio	12	14		10	36	1			1	1	38	28	578	458
Oklahoma	45	1	3	15	64	3	1		7	8	75	54	1,302	1,209
Oregon													2	
Pennsylvania	27	8	15	2	52						52	49	1,556	1,513
Tennessee													3	2
Texas	81	8	1	22	112	4	7	3	26	36	152	173	4,159	3,735
E.Tex.Bor. Co.'s		2			2						2	5	80	38
Rest of E. Texas	4			1	5				1	1	6	11	275	114
North Texas	24		1	8	33		2	1	6	9	42	57	1,229	865
W. Central Tex.	4	2		5	11	1	1		6	7	19	11	312	240
West Texas	28			4	32	3	3		2	5	40	39	858	967
Tex. Panhandle	1	1			2						2	3	203	301
G. Coast, Upper	5			1	6		1		1	2	8	12	346	365
G. Coast, Lower	13	2			15			1	3	4	19	24	569	537
Southwest Texas	2	1		3	6			1	3	4	10	6	213	259
S. Central Tex.									4	4	4	5	74	49
Utah													2	
Washington													1	
West Virginia		9		9	18						18	19	374	404
Wyoming	2				2		1		2	3	5	7	83	70
Total U. S.	285	44	31	86	446	15	15	4	74	93	554	603	13,868	12,733

* Includes distillate wells. † Includes salt water disposal wells.

the initial flow, the hole filled with 1000 feet of oil. Testing continues. Total depth is 3496 feet in the Arbuckle.

Pawnee County: What appears to be another oil pool may be proven in the northeastern area of the county, which already has a gas pool and two other oil areas. Brack & Huber's Rutherford 1, SW NE NW 8-20s-16w, about 10 miles north of Pawnee, apparently will be a pool opener. On a recent drill-stem test taken from 3816-23 feet, a good show of oil was logged. When crew completed the test and started pulling tools, the hole filled up with about 1200 feet of oil. Operation is continuing. Total depth is in the Arbuckle at 3823 feet, topped at 3815 feet.

Russell County: Oil operators have drilled about 140 disposal wells in a campaign to get rid of salt water. A number of pollution suits have been filed in the county. The disposal wells range in depth from 256 to 4165 feet, and where possible dry holes were used for the disposal systems. There are 2044 producing wells in the county, and only 163 are without adequate salt water disposal wells.

West Central Area: The Sohio Petroleum Company has staked three new wildcats in Western Kansas. Southwest of the Kraft-Prusa field in Barton County, 2 miles from Claflin, Sohio's Schneweis 1, CSW NE 31-17s-11w, will explore a subsurface high, and the hole will be drilled with the tools of Jones-Shelburn & Farmer. Sohio has about 1200 acres in the vicinity. In Rooks County, the Risely 1, CSW 3-7s-19w, has been staked, and will test a core drill prospect 1½ miles north of Webster. In Pawnee County, nine miles southwest of Larned and six miles northwest of the Zook gas pool, the firm has staked the Schnack 1, CSW NW 11-23s-17w, on a block of 1200 acres. The test is located on a subsurface prospect.

Pratt County: An attempt to extend the Cunningham pool apparently has failed, and J. W. Beck et al's Lunt 1, NW SW SW 18-28s-11w, is to be abandoned at a total depth of 4540 feet in the Arbuckle lime. Simpson, Viola and Mississippi were found dry also. The Arbuckle was topped at 4519 feet.

THE OIL MAN'S CALENDAR

AUG. 8–9–10	Interstate Oil Compact Commission, Quarterly Meeting, Grand Rapids, Michigan, Pantlind Hotel.
Sept. 16–18	AIME World Conference on Mineral Resources, New York, Waldorf-Astoria Hotel.
OCT. 1– 2	American Association of Oilwell Drilling Contractors, Annual Meeting, San Antonio, Plaza Hotel.
3– 5	AIME, Petroleum Division, Annual Meeting, Galveston, Hotel Galvez.
7–12	American Gas Association, Annual Convention, Atlantic City, N.J.
16–18	Texas Mid-Continent Oil and Gas Association, Houston, Rice Hotel.
24–25	AIME, Petroleum Division, Annual Meeting, Los Angeles, Ambassador Hotel.
28–30	Independent Petroleum Association of America, Annual Meeting, Fort Worth.
NOV. 11–14	American Petroleum Institute, Annual Meeting, Chicago, Stevens Hotel.
21–23	Rocky Mountain Oil and Gas Association, Annual Meeting, Denver, Shirley-Savoy Hotel.

☆ Illinois Basin

Mattoon Pool Extension Regarded Good Prospect

Two-mile extension of Mattoon pool seen; prospective pool opener near Kell appears a failure.

Coles County: A 2-mile northern extension of the Mattoon pool is in prospect at Kingwood Oil Company's Burtschi 1, NE NE SE 34-13n-7e. A show of oil was recovered in Cypress sand at 1783-94 feet during a drill-stem test. Operator is drilling ahead for McClosky lime.

Marion County: Sohio Petroleum Company's Hawkins 1, SE SE NW 29-1n-4e, 4 miles from Kell, may be abandoned after holding hopes as a pool opener. In early tests, the well bailed 31 barrels of oil in 24 hours from McClosky lime at 2875-85 feet. However, on later tests following acid treatment, the well showed little oil and much water during swabbing operations.

A one-half mile extension of the Tonti pool was in sight at A. J. Slagter's Branch 1, SW NW SE 4-4n-4e. Casing was set for a test of oil showings in the Benoist sand at 1952-93 feet.

Paul Doran is preparing a Cypress test in the old Benoist pool near Sandoval. It will be Guyon 1, 8-2n-1e.

The Texas Company has abandoned Wooters 1, NE NW SE 21-1n-2e, wildcat south of the Salem pool. The well was drilled through McClosky lime to a total depth of 2260 feet.

Clinton County: Paul Doran has drilled a second dry hole in the Sandoval West pool which he discovered more than a month ago. Hahn 1, 12-2n-1w was abandoned after the Cypress was found low at 1436 feet and Ney 1 was plugged earlier. The operator plans tests south and southeast of the discovery well.

Franklin County: Operators are preparing to spud a new wildcat test at George and Wrather's Burr 1, SE SW SW 33-6s-4e.

Hamilton County: Claude Neon Lights' Wilson 1, NE SE SW 30-6s-6e, a new wildcat, is drilling below surface casing. The well is a mile southeast of production in the Hoodville pool area.

Washington County:. Ben Taylor's Bauza 1, SW SE SW 6-3s-1w, a wildcat test, was abandoned after drilling through the Benoist sand encountered at 1420 feet. The pay was 11 feet lower than expected and total depth of the hole was 1476 feet.

☆ Michigan

Three Small Wildcats Reported During Week

Three wildcats rated discovery oil wells but initial prospects promise only small pools.

Van Buren County: W. D. Gannett's Chamberlain 1, NE NW SW 17-1s-15w, Columbia Township, was pumping between 50 and 70 barrels daily from Traverse lime pay at 1127-30 feet for pool opener 3 miles southwest of old Columbia-Bloomingdale field. History of these typical coral reef type fields shows that numerous tests must be drilled to enable any determination of the productive area or recovery. Some cover only 40 acres and others run up to 5000 acres. The completion cost, $5000 to $10,000, is comparatively low.

Montcalm County: McClure Drilling Company's Wicks 1, SW NE NW 36-11n-6w, 4 miles west of the old Crystal oil field, is pumping an average of 50 barrels of oil per day from Dundee pay at 3337-38 feet. So far it has failed to command the attention of a major area.

Kent County: Oil Producers, Inc., completed Brewer 1, NE SE SE 8-5n-11w, 9 miles southeast of old Walker field, for 3 barrels a day from Traverse lime pay at 1859-1910 feet.

Mecosta County: Carter Oil Company abandoned Doan 1, NW SW NE 8-14n-7w, 1320 feet north of Rex's Weller 1 extension producer in the Wheatland district, marking the second offset failure to the extension and at least for the time eliminating the area as a major field prospect. Earlier drilled the west offset dry. Both offsets were 25 to 29 feet lower structurally than the producer.

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☆ Rocky Mountain Area

Union Oil Company of California et al's important wildcat test, U. P. Railroad 1, C SE SE 17-17s-48w, in Kiowa County, eastern Colorado, is drilling below 5600 feet. Staining has been reported in cores at around 4300 feet.

Montana

Liberty County: The Texas Company's test of the Utopia area, Lass 2, NW NE SW 14-33n-4e, had only a show of oil in the zone productive at nearby East Utopia. The well is drilling ahead at 3174 feet.

Wyoming

Converse County: Carter Oil Company's wildcat test of the south side of the Powder River Basin at Shawnee Well No. 120-C Unit, C SW NW 19-33n-68w, has been coring hard, tight Dakota sand below 11,620 feet, with no shows of oil or gas. This test may go as deep as Tensleep sand (13,000-14,000 feet) and if so, will establish a deep drilling record for the Rocky Mountain region.

Fremont County: Sinclair Wyoming Oil Company's wildcat at Lysite is drilling below 4800 feet, still in Tertiary. The well is No. 1 Unit, NE NE NW 35-39n-91w, and no shows were encountered in the sand which had a small gas show in Ohio Oil Company's shallow test 3 miles northwest of the Sinclair test.

Sweetwater County: A disappointment for Tertiary prospects in the Great Divide Basin was The Texas Company's Table Rock 2, SE NW NW 31-19n-97w. This well is abandoned at 4106 feet after testing water in the sand zone productive of 1.5 million cubic feet of gas two months ago in the discovery well ½ mile southwest. There has been concentrated leasing by most active majors in the area north of the Table Rock discovery.

Washakie County: The Neiber Dome 1, wildcat of G. & G. Drilling Company, SE NE NW 19-45n-92w, is testing Muddy sand at 8130 feet, total depth. A small show of gas was reported in cores. This well blew out at 5350 feet but on test the gas zone proved small.

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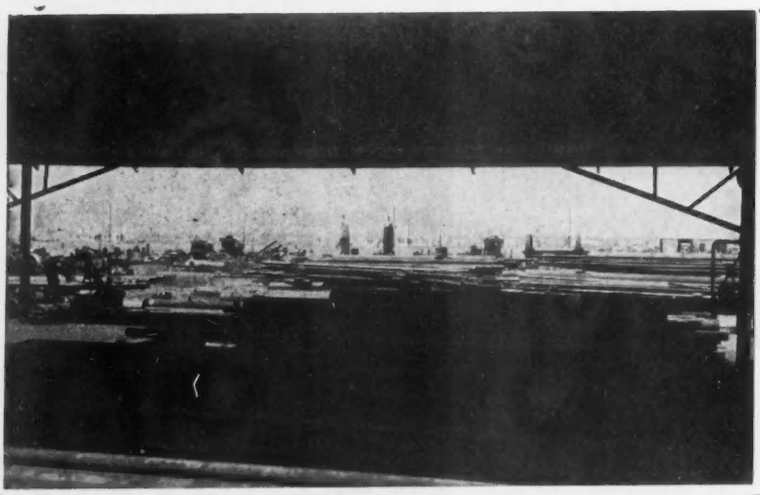

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☆ California

Paloma Field Producer Shows Excellent Results

Excellent well brought in on northeast flank of Paloma field; South Belridge deep test nearing 12,000 feet; new test for natural gas in Tehama County gets under way; wildcat being drilled by six majors near Los Angeles airport to test for production in Schist.

Several California exploratory wells which showed signs of promise have either turned out dry or are tied up with mechanical trouble. This is particularly true in the East Los Angeles field where initial development appears to be located unfavorably for production. There is, however, no diminution in wildcatting, although the volume of drilling generally has shown a slight downward trend in recent weeks.

Kern County: Best completion was in the Paloma field, Western Gulf Oil Company's Los Angeles Athletic Club 76-1, in 1-32s-26e, which flowed at the rate of 2300 barrels per day through a 26/64-inch choke. Choke has been reduced to one-eighth inch and the well is currently flowing 371 barrels of 32.7-gravity oil, with 2000 pounds flow pressure and 427,000 cubic feet of gas. Total depth is 11,975 feet. The well, on the field's northeast flank, appears to be the best producer to date from the black oil zone in this area and adds an additional 120 acres to the unit plan.

Chanslor-Canfield Midway Oil Company has staked a location for well 35-14 on the north flank of the Paloma field in 35-31s-26e, northwest of Western Gulf's recent completion.

Belridge Oil Company's deep test of the South Belridge field, 62-W-33 in 33-28s-21e, is spot coring below 11,880 feet. Well's objective is the Wagon Wheel zone, productive in the North Belridge field.

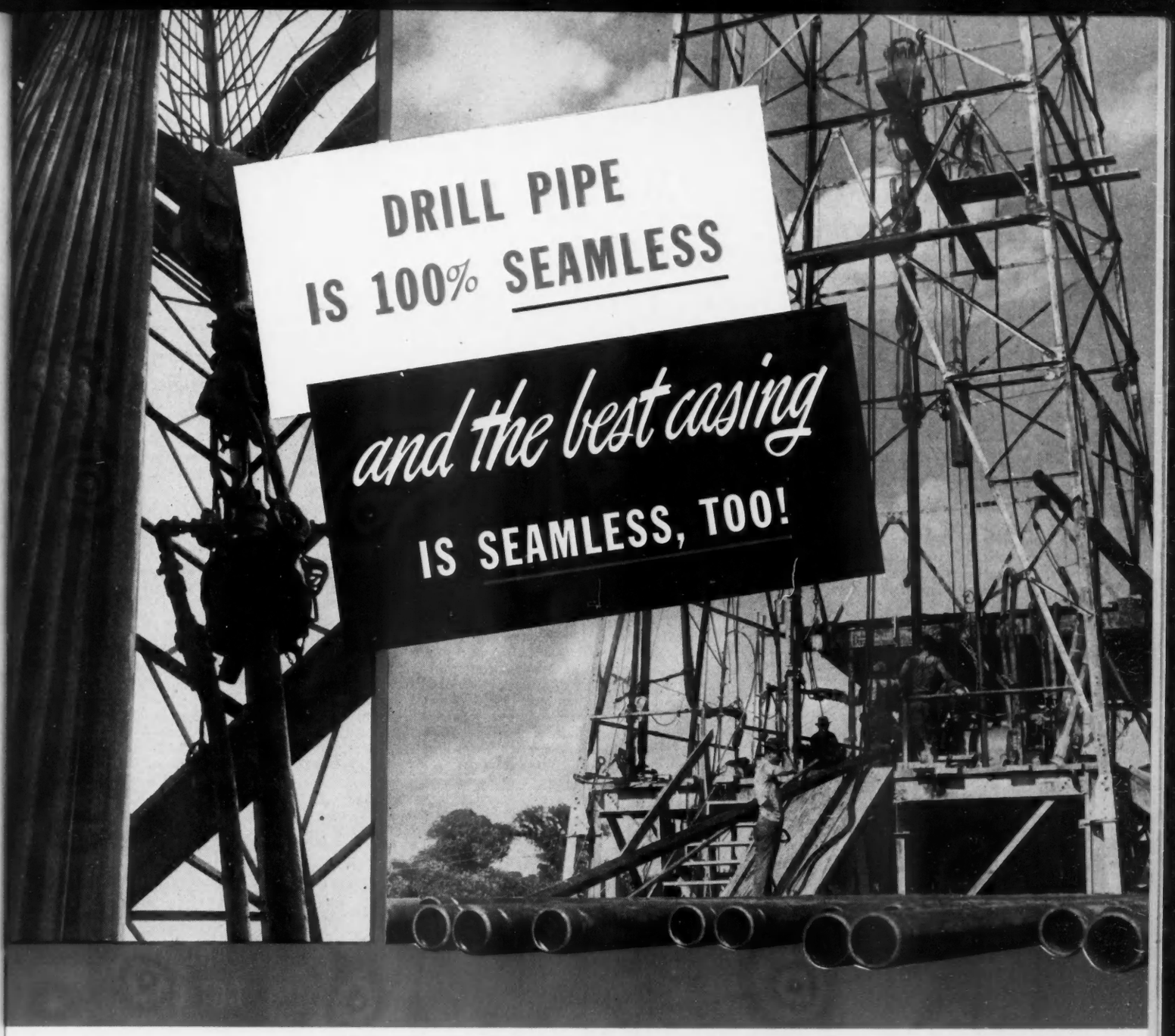
Tests have been inconclusive in W. T. Woodward and American Placers, Inc., Flickinger 1 in 36-30s-22e, midway between the western boundary of the Elk Hills Naval Reserve and McKittrick. Gassy oily mud was recovered at 6113-6859 feet and the well flowed some gas. In expectation that it will clean up, the well will be permitted to flow.

Solano County: The joint test of Honolulu Oil Corporation and Barnsdall Oil Company, north of the Rio Vista gas field, Liberty Farms 3 in 17-5n-3e, drilled to 5000 feet, has been abandoned.

Tehama County: Superior Oil Company's Saldubehere 2 in 35-24n-3w, a location five miles south of Superior's Saldubehere 1, the discovery well of the Corning gas field, is a newly-started gas test.

Los Angeles County: The joint wildcat being drilled by six major companies near the Los Angeles airport, Fee 1, in 2-3s-15w, is coring at 7030 feet in the objective Schist. An electric log was run and decision made to drill deeper before further testing. A test at 6841-6845 feet just above the Schist showed no oil.

Ohio Oil Company is testing shut-off on 7-inch casing, cemented at 9100 feet in its Gardena wildcat, Gardena Community 4-1 in 23-3s-14w. Total depth is 10,288 feet. The Texas Company and British-American Oil Producing Com-



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pany's Bodger 1 in 22-3s-14w, is drilling below 6510 feet.

In the Newhall area Shell and two unidentified associated companies have staked location for a wildcat on property of the Braille Institute for the Blind in 2-3n-16w.

In the East Los Angeles field Richfield Oil Corporation's Edison 1 in 16-2s-12w, the next well scheduled for completion, continues to fish for formation tester. Total depth is 8000 feet. A production test in Richfield's Vail 2 in Section 16, bottomed at 8836 feet, was unsuccessful due to packer failure. Prospects are not too bright for Richfield's Keller 1 in Section 9, coring below 9000 feet. Chanslor-Canfield Midway Oil Company continues to drill ahead in its outpost well, Bandini 1 in Section 21.

Los Angeles Wing Ding Scheduled for July 26

The seventh annual Wing Ding of the Los Angeles Chapter of Nomads will be held July 26 at the Riviera Country Club, Santa Monica Canyon. Arrangements have been made to accommodate 400 Nomads and guests.

☆ New Mexico

Eunice to See Activity Due to Yeso Extension

Ellenburger pay in Brunson field thinned to the east due to high granite top; large-scale deepening operations to occur in Eunice townsite area for prolific Yeso production; Paddock structure dips sharply to north; second deepest well in state tests water in Ellenburger.

Dublin Field: Humble's Leonard-Federal 1-B, ½ mile north of its Ellenburger discovery and the second deepest test in the state, tested water in Ellenburger at 12,458-12,535 feet. It is to be plugged back to near the 7000-foot level to test nominal shows passed up in the Permian.

Lea County: Magnolia Petroleum Company's Brunson-Argo 12, SE NE 9-22s-37e, southeast edge of the Brunson field and the highest of eight Ellenburger wells, logged a short section of pay due to entering granite at 7466 feet. It is bottomed at 7471 feet. Pipe was set at 7395 feet to complete through open hole. Drill-stem test at 7377-7470 feet tested oil and gas, although the main body of pay is absent.

Magnolia Petroleum Company's Marshall Unit 2, deepened well in the north portion of the Penrose-Skelly field, flowed 84 barrels of 39-gravity oil hourly, with gas-oil ratio of 1286/1, on natural open tubing test of Yeso perforations between 6464 and 6608 feet. This well is ½ mile west extension of the four-well area.

Amerada Petroleum Corporation's Hare 2, C NW SW 33-21s-37e, and 1¼ miles west-by-south extension, cemented 5-inch on bottom at 6623 feet to complete through perforations. This deepened, regular Permian well logged Yeso pay from 6490 to 6602 feet, while drill-stem tests confirmed large gas yield in the upper zone and prolific oil flow below. Deepening of old wells to the Yeso will cost from $60,000 to $70,000, while new tests will average from $70,000 to $80,000 in cost.

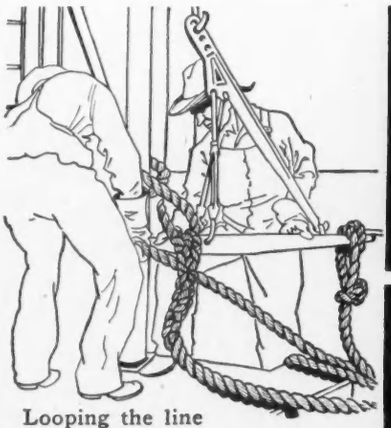
Paddock Field: Repollo Oil Company's State 1-367, north offset to the 5100-foot Glorietta pay and a failure in this zone, was drilling lime at 5705 feet. The company's Simmons 1, 1⅓ miles north by east of production, was drilling at 6250 feet, having entered the Glorietta at 5395 feet.

☆ Mississippi

New Pay Seems Assured For the Cranfield Field

New pay for Cranfield field in Adams County apparently assured; Lincoln County active.

Adams County: The California Company's Ella G. Lees 9, 45-7n-1w in the Cranfield field, reports several successful tests for gas production from the Paluxy horizon which lies considerably below the Wilcox and Massive sand zones, regular producing horizons for the field. Casing was perforated at 11,772-794 feet with 48 shots and with packer at 11,750 feet well flowed 13,400,000 cubic feet of gas per day through ½-inch tubing choke. Tests are continuing. Humble Oil & Refining Company's Adams County Board of Supervisors 1, SEc 47-6n-1w, Massive sand test has been abandoned at total depth of 10,309 feet with no shows. Both the Wilcox and Massive sand zones were extensively cored. In the Cranfield field California's A. M.



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Ratcliffe 9, 71-7n-1w, has perforated casing at 10,340-380 feet opposite the productive Massive and is preparing to test. Roeser & Pendleton-Sohio Oil Company's W. J. Maier 1, NWc 34-6n-2w in the LaGrange field, is drilling below 4213 feet with no shows recovered so far. The Maier offsets the Baker-Maier 1, discovery well for the field which was brought in early last spring, but which experienced considerable trouble with salt water input in its final completion.

Claiborne County: Sun Oil Company's W. R. Hammett 3, 15-11n-1e in the Bruinsburg field, is drilling below 2300 feet. Slight shows of gas were recorded at 1355 feet and 1527 feet.

Forrest County: The Superior Oil Company's Cassie Bradford 1, SEc SW NW 1-3n-13w deep test is drilling below 9995 feet.

Lincoln County: Roeser & Pendleton's Columbus Lumber Company's 1, NE NW 20-6n-6e 10,000-foot test is drilling below 7700 feet. Wilcox horizon was extensively cored with no shows. The California Company's Mary Parnell-McDaniel 1, NEc SE 17-6n-8e, a 10,000-footer, is drilling below 8325 feet with no shows. Humble Oil & Refining Company's Lincoln County Board of Supervisors NEc 16-8n-5e is waiting on derrick and rig. In the Brookhaven field The California Company has three tests going down, but none has reached the productive zone below 9000 feet. No shows were reported from the Wilcox. Sun Oil Company's Leon Case 1, NEc 17-7n-7e in Brookhaven is drilling below 8000 feet with no shows.

Issaquena County: Stanolind Oil & Gas Company's J. B. Benton 1, 18-9n-6w has been abandoned at a total depth of 4998 feet. First of a series of stratigraphic tests in the area, the well reported no shows.

Jasper County: Gulf Refining Company has taken out permit for its J. B. Ruffin 1, SWc 27-10n-13w offset to the Edwards-Bailey 1, which was completed for a good gasser in March, 1945. The producing horizon for this, the Soso field, is the Eutaw. Only one operation is active in the Heidelberg fields, Richard B. Lack's Morrison 1, SEc SW SW 12-1n-12e in East Heidelberg being bottomed temporarily at 526 feet after running casing to that depth.

Yazoo County: Union Producing Company's Jennie Stevens 23, NEc 12-10n-3w in the Tinsley field which is undertaking to develop commercial production in the Tuscaloosa is running electrical log at a total depth of 5909 feet in that zone. Cores taken at 5889-5909 feet recovered sand and shale with no shows reported. Plains Production Company's E. W. Milner 6, NEc SW SW 7-10n-2w in Tinsley has been completed from the Perry Sand at 5452-88 feet. Initial production was 30 barrels of 24.6-gravity oil per day.

Clarke County: Sun Oil Company's Long Bell Petroleum Company 2, NWc NE 17-2n-17e, wildcat, has been abandoned at a total depth of 5563 feet in the Comanchean horizon with no shows. Kirby Petroleum Company's Long Bell Petroleum Company F-3, SE SE NE 30-1n-18e, first of the company's three tests in the field, has run casing to a total depth of 230 feet.

Warren County: McAlester Fuel Company's Anderson-Tully Lumber Company 1, NE NE 35-18n-1e, in western Mississippi is drilling below 2948 feet with no shows reported.

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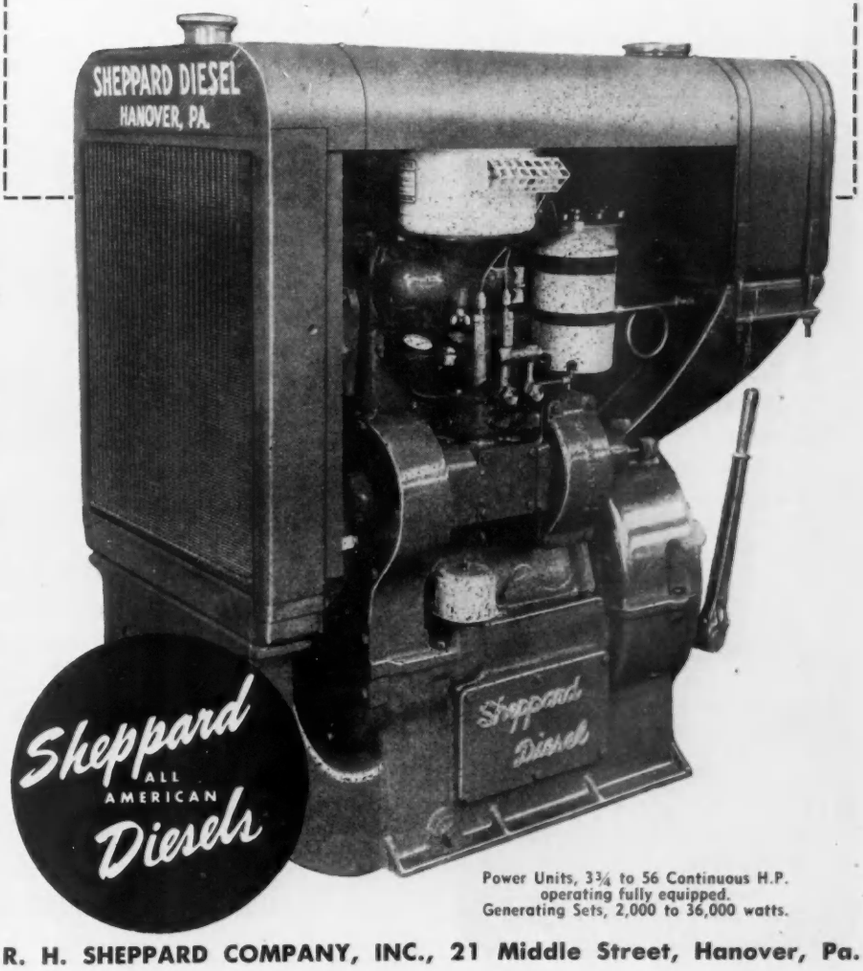

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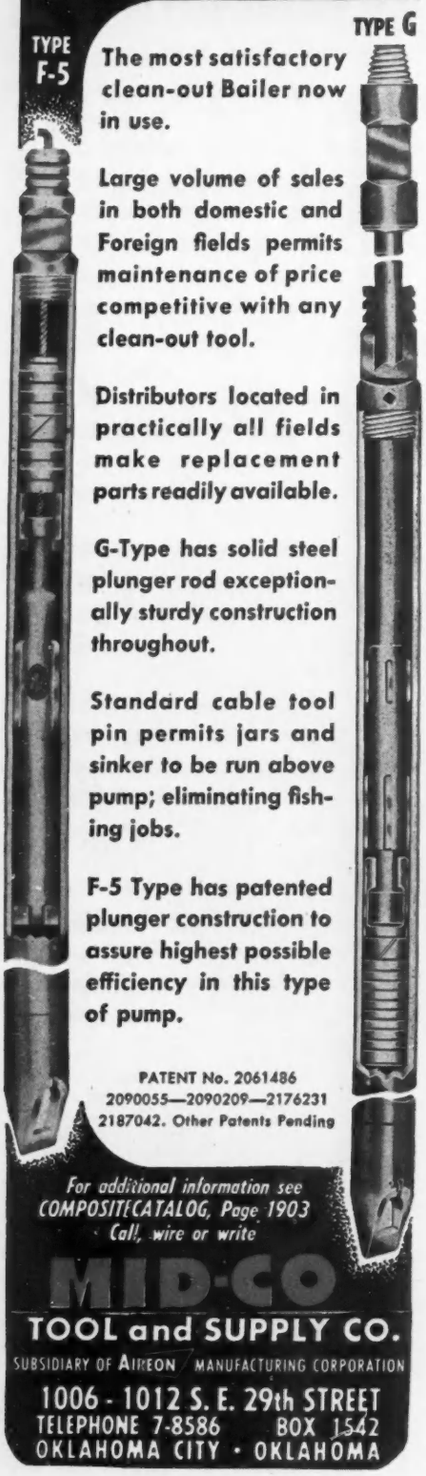

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☆Southeast States

Florida

Ohio Oil Company's Hernasco Corporation 1, NWc 19-23s-18e, Hernando County, which had previously reported slight shows of oil has finally been abandoned in sandstone at a total depth of 8472 feet. The well previously had reported shows of oil in dolomite cores at 5584-5600 feet, but subsequent drill-stem test recovered only mud and salt water.

Walton County: Rogers Lacy & Associates' Walton Land & Timber Co. 1, SW SW 14-1n-18w, second test in the area during the last 3 years, is drilling below 4575 feet with no shows. Cores taken at 4076-96 feet recovered sandy shale. It was also reported that cores from the Eutaw carried salt water.

Osceola County: Humble Oil & Refining Company's N. Ray Carroll 1, SE SE 10-27s-34e, wildcat is drilling below 6937 feet with no shows reported. Cores taken at 5499-5542 feet recovered sand with fair porosity.

Volusia County: Sun Oil Company's Powell Land Co. 1, SWc 11-17s-31e, wildcat, is waiting on cement after setting casing to a total depth of 104 feet. It is understood that the well will head for the 6000-foot zone.

Dixie County: Stanolind Oil & Gas Company and Sun Oil Company's Perpetual Forest 1, NW NW 5-11s-11e, wildcat, is drilling below 6237 feet with no shows reported.

Hillsborough County: Humble's T. S. Jameson 1, NE NE 7-31s-22e, deep wildcat test, is bottomed temporarily for repairs at a total depth of 10,022 feet. Electrical log has been run to 9084 feet. No shows have been reported.

Monroe County: Gulf Refining Company's State 1, Lse 373, SWc 2-67s-29e, is drilling below 9132 feet in anhydrite and lime with no shows reported.

Collier County: Humble's Gulf Coast Realty Company 8, SW SE 19-48s-30e, in the Sunniland field, is running 9⅝-inch casing after reaching a total depth of 5750 feet. No shows have been reported.

Alabama

Glen D. Rose Oil & Gas Company's First Naional Bank of Birmingham 2, NW SE 30-12s-7w, wildcat in Walker County, is drilling below 2653 feet. No shows have been reported recently.

Choctaw County: The Carter Oil Company's E. A. Rentz 1, NE NW NE 4-10n-3w, in the Gilbertown field, has not yet eliminated trouble due to stuck drill-stem. Hole is being conditioned and driller continues to wash over.

Brown Succeeds Jones

Floyd C. Brown, vice president and general manager of Natural Gas Pipeline Company of America since its organization, has been elected president, succeeding W. Alton Jones, who will serve as chairman of the board. Brown will continue his duties as general manager. Brown, who joined the Empire Companies organization in 1917, has also been elected president of Texoma Natural Gas Company and Quadrangle Gas Company.

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PATTERSON-BALLAGH'S new DEEP WELL SWAB is a true champion. It came up the hard way, licking one field problem after another through months and months of the toughest tests. *Now*, it is ready to take on all comers. When it comes to swabbing this new Deep Well Swab is a winner! *Developed by production men, it does the job production men want when swabbing.*

Large fluid passage clearances permit free dropping. Pulls either light or heavy loads from great depths without fluid loss, brings a complete load each trip. Sensitive, special rubbers expand under light load, proper cup support keeps them in place under heavy load. Easily adjusted to irregular I.D.'s of tubing and to compensate for wear. Simple design, made of standard parts in both tubing and casing sizes, easy to operate on rig floor, quickly tandemed. *A deep well Swab that really cuts swabbing costs.*

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- Large fluid passage.
- Standard reversible ball and seat, a pump manufacturers' part replaceable anywhere.
- Rubber quickly changed on job—break here to install rubber.
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- Two reinforced PBX Special Rubbers used.
- API threads throughout. Lead Thread compound for easy break.
- All heat treated alloy steel. Tensile strength maximum. (Tensile strength 2½" Swab twice that of ⅝" sand line).
- All parts rust-proofed per rigid Navy specifications.
- Break here to tandem Swab.
- Large internal area plus streamlined inlet reduces tendency to blow out of hole to a minimum.

To expand rubber make up on cup. Use special gauges to check rubbers.

Illustration shows use of gauges in adjusting rubbers to correct O.D.

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☆ South Louisiana

New Cockfield Production in Beauregard Parish; 3 New Pays

Magnolia opens new field in Oretta area; pay sand found higher in Bon Air outpost; new sand discovered at Whitecastle; La Pice field well completed in new pay zone.

Beauregard Parish: Magnolia Petroleum Company's Powell Lumber Company 1 has opened a new Cockfield producing field in Southern Louisiana. Located in Section 17-16s-11w, 2 miles northwest of the North Oretta discovery and 3½ miles north of production in Oretta field proper, the wildcat flowed 84.81 barrels of 43.9-gravity oil daily through 7/64-inch choke with 1250 pounds flowing pressure on tubing and gas-oil ratio of 1231/1. Total depth is 8800 feet with 5½-inch pipe set to 8510 feet and perforated for completion at 8412-18 feet in the Cockfield. This is Magnolia's third discovery in Beauregard Parish in 1946.

Jeff Davis Parish: Sohio Petroleum Company's Fontenot 3-B, 15-10s-6w, 1320-foot south outpost at Bon Air field, has found the pay sand higher than that in the present 3 producing wells. The outpost has been completed for 186 barrels of oil daily through ⅛-inch choke with 1325 pounds pressure on tubing and gas-oil ratio of 552/1. Total depth is 9760 feet with casing set on bottom and perforated for completion at 9680-86 feet.

Iberville Parish: Shell Oil Company's Wilbert 23, 8-11s-12e, in the Whitecastle field, has been completed in a new sand for the field. From perforations at 7311-20 feet the well flowed 195 barrels of 31.7-gravity oil daily with flowing pressure of 1100 pounds on tubing, 1180 pounds on casing, and gas-oil ratio of 445/1.

St. James Parish: At La Pice field Shell Oil Company's Mrs. H. Schenexnayder 4, 38-12s-15e, has been completed in a new sand. Perforations are at 9716-29 feet and on potential the well flowed 176 barrels of 33.1-gravity oil daily through 8/64-inch choke with 950 pounds tubing pressure and 1100 pounds casing pressure. Gas-oil ratio was 376/1. Total depth is 9962 feet with 5½-inch pipe set at 9882 feet.

Terrebonne Parish: Union Oil Company of California has extended gas-condensate production in the Houma field ½ mile southeast with the R. R. Barrow 1, 1-17s-18e. Drilled to total depth of 10,498 feet with 5½-inch casing set to 10,402 feet, perforations for completion were made at 10,310-318 feet where a good show of gas and condensate had been tested. Production gauge was to be made after surface equipment had been installed.

Oil Employes Protected

Approximately 80 percent of all employes of the oil industry in California are covered by voluntary medical and hospitalization plans.

Returns were received from 18.7 percent of the operators in California. Analysis of the returns shows that the companies reporting plans account for between 80 and 90 percent of the employment in the industry.

SEP Wakes Up!

Last week we paid tribute to the Saturday Evening Post. At the risk of having you think we've bought Curtis stock, we want to say that by reading the editorial page, we got our dime's worth out of the June 29th issue, too. Ben Hibbs takes an adroit crack at the "bad economics and worse morals" of labor unions, "OPA's Little People" and American tolerance of communism and the Soviet Union. Any time any publication with three and one-half million paid-in-advance subscribers makes any effort to save America from Roosevelt repercussions, we're going to halt our supply and equipment service long enough to applaud! To the best of our knowledge and belief there will be no dissenting voice among our customers. We cater to intelligent people.

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☆ Upper Texas Coast

Colorado County Field Outpost Has Possibilities

Ramsey outpost shows for possible production; Village Mills area wildcat has show; Pierce Junction flank test to drill directionally closer to dome; Hempstead wildcat abandoned.

Colorado County: Cities Service Oil Company's Krider 1, 3100-foot south extension test to the Ramsey field, showed for possible commercial production of gas and condensate during two tests. On initial test from perforations at 8884-86 feet the well flowed at the rate of 3,210,000 cubic feet of gas daily with 40 barrels of condensate and 29 barrels of water through ⅜-inch choke with 1050 pounds pressure. The second test at 8872-76 feet using ⅜ and ¼-inch chokes developed 1000 pounds working pressure and on seven-hour test flowed at the rate of 62.8 barrels of condensate with 8.92 barrels of brackish water. Total depth of the well is 9598 feet with 5½-inch pipe set to 9210 feet. Additional tests will be made.

Hardin County: Houston Oil Company of Texas' Fee 1, wildcat in Thomas Penny survey Abst. 424, 3 miles west-southwest of nearest production in the Village Mills field, had a showing of gas and condensate at 8985 feet. A test made from 8937-70 feet for 45 minutes blew out the water cushion after ten stands were pulled, and recovered six additional stands of water cushion and rat hole mud cut with gas and condensate. An earlier test made from 8928-40 feet showed gas and condensate.

Harris County: Gulf Oil Corporation's Settegast et al 2, on the west flank of production at Pierce Junction, Jos. Kopman survey Abst. 85, ran directional hole survey in preparation to drill directionally 400 feet closer to the dome. The test failed to obtain commercial production from deep sands through perforations at 9922-34 feet and 8356-72 feet and cement plug was set in preparation for the directional drilling program.

Waller County: Floyd L. Karsten's Menke 1, wildcat in the M. M. Coats survey, two miles southwest of Hempstead and five miles north of Raccoon Bend field, has been abandoned. Drilled to total depth of 10,003 feet where 5½-inch casing was cemented, the well flowed gas, distillate and salt water with 3400 pounds bottom-hole pressure on a test of a sand at 9896-9920 feet. A test in the 9700-foot sand from 9714-28 feet recovered a small amount of mud with slight show of oil and gas, and seven stands of sulphur water, with bottom-hole pressure of 2500 pounds.

☆ Lower Texas Coast

Oakville-Wilcox Outpost Tests for Production

Production casing set in Tynan area wildcat; well in West Magnolia City field tests for completion in shallow gas sand; Oakville-Wilcox outpost tests for production; northeast outpost at Burnell-Wilcox completed.

San Patricio County: Southern Minerals Corporation has set production casing in the John R. & Floy L. Beasley

1, wildcat 1½ miles southwest of Tynan townsite near the Bee County line. On drill stem test at 4900-20 feet the wildcat showed gas and ran another drill stem test below this depth with results unannounced. Total depth is 4997 feet. The well is located 990 feet northwest of the SA&AP RR right-of-way, and about a mile northwest of Southern Minerals' Clifton 2, which tested for production in perforations at 4623-28 feet but recovered salt water and was abandoned in May at total depth of 5305 feet.

Jim Wells County: Ralph E. Fair, Inc.'s Wm. F. Filter 1, in the West Magnolia City field, gauged an estimated 6,250,000 cubic feet of dry gas daily from the new shallow sand at 3752-53 feet. Located 2350 feet north-northeast of the Reynolds and Richardson discovery well, the Filter 1 missed the 5400-foot discovery oil pay and also missed in the deeper Stillwell sand. The well was drilled to total depth of 5845 feet with 5½-inch casing set to 3880 feet for completion.

Live Oak County: Stanolind Oil & Gas Company's Reagan 1, outpost ¾ mile southwest of Oakville-Wilcox field, swabbed dry after drilling out casing shoe at total depth of 6738. With casing set on bottom tubing was pulled and found the last joint plugged. The tubing has been re-set and production tests were to be made after pressuring with gas. Test is of the Slick sand which has shown for 36-gravity oil production.

Karnes County: Stanolind Oil & Gas Company's Lyons 2, northeast outpost at the Burnell-Wilcox field, has been completed for 106 barrels of oil daily on 3/16-inch choke with tubing pressure of 280 pounds, casing pressure of 750 pounds and gas-oil ratio of 530/1. Total depth is 6884 feet in the Wilcox with 5½-inch casing set on bottom and perforated for completion at 6882-83 feet.

☆ Southwest Texas

Kelsey Shallow Field Extension Being Completed

Extension test at Kelsey (shallow) field being completed; second test on south flank of old Carolina-Texas field started; second producer for new Cortez field completed.

Starr County: J. O. Clark's Gonzales Unit 1-A, half mile south extension test for the Kelsey (shallow) field, is being completed. The well found a sand with oil odor at 4748-56 feet and set 5½-inch casing on top of the pay for completion. Total depth is 4756 feet. The well is located 467 feet from the north line and 800 feet from the east line of tract 3-A, Santa Teresa grant, and 2450 feet southeast of Sun's Trevine 2-B dry hole.

Webb County: O. W. Killam has started the Servando Benavides 2 as the second test on the south flank of the old Carolina-Texas field. It is located 4000 feet east of the Benavides 1 dry hole. The Benavides 1 was drilled to total depth of 3825 feet and logged sand with oil odor at 2147-52 feet and 3086-89 feet.

Starr County: W. H. Holland's Roos-Bennett 2, second oil producer in the newly discovered Cortez field, between the Garcia and Boyle fields, has been completed for 66 barrels of 22.8-gravity oil daily with no water through ¼-inch choke with tubing pressure of 550 pounds, casing pressure of 800 pounds, and gas-oil ratio of 4000/1. Total depth is 3006 feet and perforations are in the discovery pay sand topped at 2910 feet.

Longer Vacations

Standard Oil Company of California has completed an agreement with the Standard Sales Employes' Council whereby company employes represented by the Council with 15 or more years of service will be granted three weeks annual vacation with pay instead of two weeks.

The company also is extending the longer vacation to all employes of 15 years service or more.

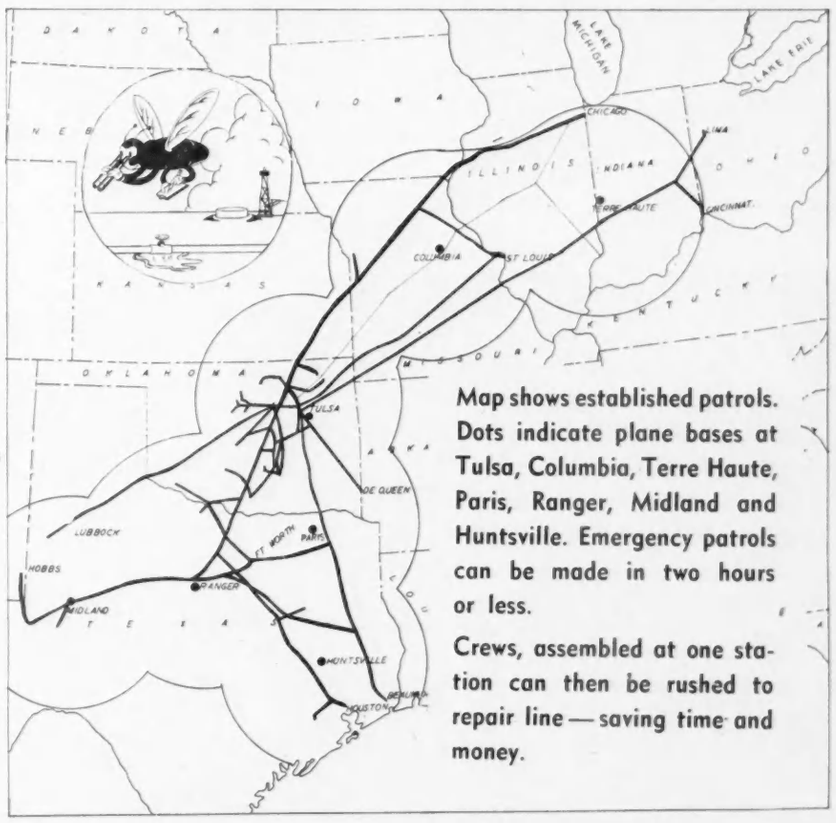
☆ South Central Texas

Production Casing Set For Atascosa Wildcat

Production casing set at Fashing wildcat; Luling wildcat tests on pump; Pearsall field well completed for 63 barrels daily.

Atascosa County: H. R. Smith & Skinner & Eddy Corporation's Wiegang 1, wildcat 3¼ miles northwest of Fashing in the extreme east corner of the county, is reported to have recovered oil on drill stem test and to have set production casing. This test lies 2000 feet northeast of the Hurt & Tartt 1 dry hole which was abandoned in June at total depth

NEW Air Patrol Service Greatly Reduces "Shut-Down" Time



Map shows established patrols. Dots indicate plane bases at Tulsa, Columbia, Terre Haute, Paris, Ranger, Midland and Huntsville. Emergency patrols can be made in two hours or less.

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of 3917 feet in Wilcox sand. This prospect has been drilled by Gulf Oil Corporation, which drilled a 6632-foot dry hole on the Hurt & Tartt tract and a 10,528-foot dry hole in the Ada Tom land, both of which are west of the present test.

Guadalupe County: United North & South Devonian Company's Webb 1, wildcat discovery 4½ miles southwest of Luling, is reported to have tested on the pump an estimated 3 barrels of oil per hour from perforations at 2421-53 and 2485-2505 feet after acidizing with 1500 gallons. Production is from Serpentine and Austin chalk at this level. The well is located 8600 feet from SW line and 1600 feet from SE line of James Hodges survey.

Frio County: Highland Oil Company's Halff & Opperheimer 11, southwest of the Chas. Melms 2 by 1150 feet and in the Pearsall field, has been completed for 63.5 barrels of 25.2-gravity oil daily on the pump with gas-oil ratio of 450/1, with 15 percent salt water and gas-oil ratio of 450/1. The well was drilled to total depth of 3938 feet with 5½-inch casing set on bottom and perforated for completion at 3920-25 feet.

Houston Nomads Meeting

The next regular meeting of the Houston Chapter of Nomads will be held Monday, August 12 at the Old College Inn. There is no regular meeting of the Houston Chapter scheduled for July, it having been decided at the June meeting to change the regular meeting date from the fourth Monday to the second Monday of each month.

☆ West Texas

Deeper Pay Likely for Andrews County Wildcat

Deeper pay in prospect for Andrews County wildcat; Ellenburger sector of the Fullerton field expanded half-mile east; Wheeler field east outpost shows Devonian oil below prolific gas-distillate zone.

Andrews County: The Texas Company's University 1-P, indicated Clear Fork oil discovery for the Block 12 large structure, showed promise of making a producer from the Devonian. Drill-stem test of this zone at 8075-8157 feet yielded 150 feet of oil and gas-cut mud and little free oil. Second test at 8155-8210 feet returned 250 feet of slightly oil and gas-cut mud. No water was evident. A 10,760-foot failure, 1-1/16 miles northwest and lower structurally, showed water at this level in the Devonian. Scheduled Clear Fork tests near this wildcat have been increased to 6 due to leases requiring production by November 14.

Fullerton Oil Company's Wilson 342-A, half-mile east of its Ellenburger oil discovery for the Fullerton field, entered the Ellenburger at 9780 feet, correlating 113 feet high, and drill-stem test at 9855 feet yielded 3800 feet of clean oil. The well headed in breaking down stem. It may attempt to establish thickness of the pay before running pipe to complete through perforations. The Ellenburger discovery was completed at 40 feet in the zone.

Gaines County: Amerada's Jones 1-D, ⅝ mile southeast outpost for the Jones Ranch field, was drilling at 8595 feet, having entered the Tubb at 7310 feet, or 91 feet low. The company's Tannehill 1, ¾ mile northwest outpost and in Yoakum County, entered the San Andres at 4640 feet, or 50 feet high, and was drilling at 7510 feet.

Garza County: Northern Ordnance, Inc.'s Walker 1, SE SE SE H&GN Ry. 45, Blk. 6, 6 miles west of the Justiceburg pool, nearest production, was preparing to test with 7-inch at 2410 feet after logging broken pay to 2475 feet in San Andres, topped at 2440 feet with elevation of 2265 feet. Drill-stem test showed little gas. Plymouth Oil Company's Slaughter 1, 7½ miles south of the Post field, was awaiting orders at

Drilling Gains

Noticeable improvement in supply of new pipe and tubing from mills is reflected by steady expansion of development of deep areas in West Texas.

The volume of activity in the deep high-gravity sweet crude areas in that section has taken an upturn that is expected to gain momentum during the remainder of the year. The supply of tubular goods will not be ample for the operators in the deep areas to hit full stride until the last quarter of the year, but the period of borrowing, or negotiating for a single string of pipe has apparently ended.

Deep areas in Andrews, Ector and Winkler counties will receive a large portion of the new drilling.

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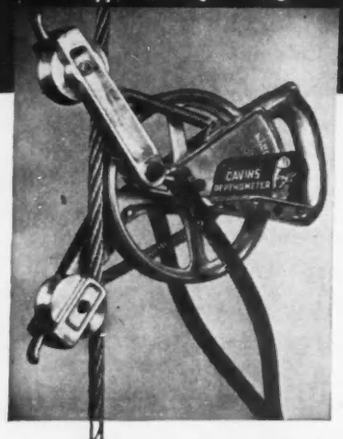

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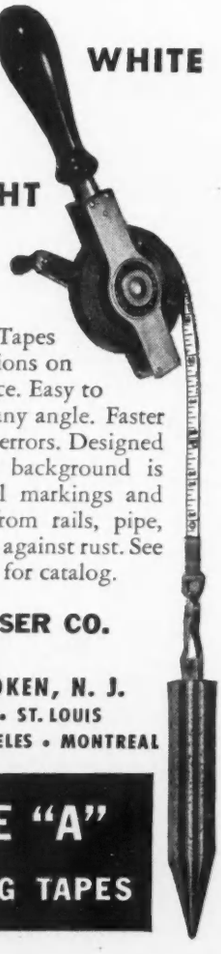

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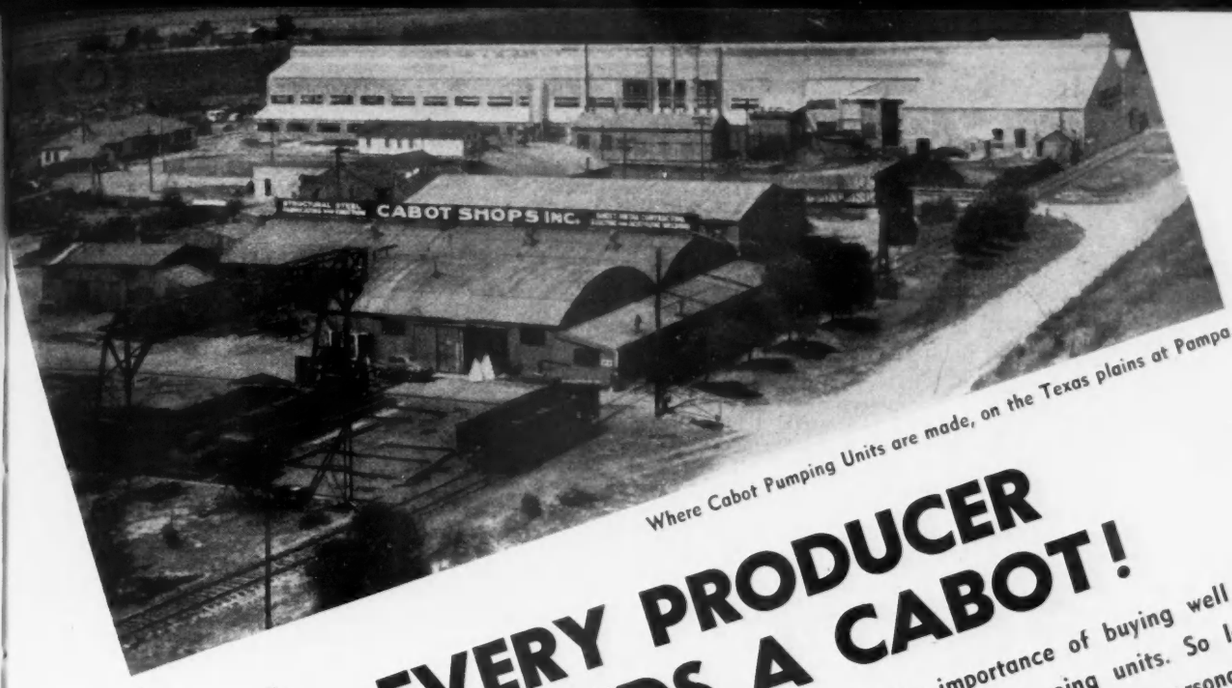

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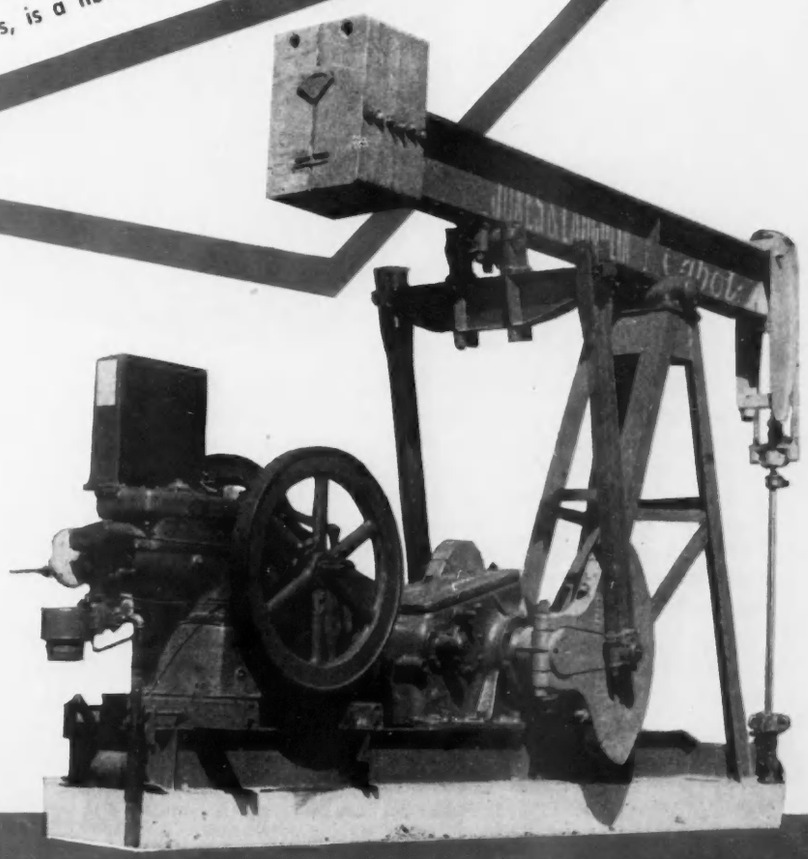

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4506 feet, having entered barren Clear Fork at 3815 feet.

Ector County: Phillips Petroleum Company et al's Eidson-Scharbauer Unit 1, re-worked Ellenburger discovery for the Penwell field, failed to exclude water encroachment and has been re-completed flowing 70 barrels of fluid, averaging 78 percent oil, daily through ⅛-inch choke. This production is from perforations at 8895-8910 feet in Ellenburger, topped at 8888 feet. E. E. Fogelson and Cosden Petroleum Corporation's University 1-C-D, 1⅞ miles southeast of this deep-pay discovery, was fishing at 7249 feet. Top of Silurian was tentatively called at 7210 feet, correlating 155 feet high.

Cities Service Oil Company's Parker-Wentz 1, Harper area, was drilling at 12,315 feet in Simpson, topped at 11,695 feet. Stanolind et al's Kayser Unit 1, Foster area, was drilling lime and chert at 12,355 feet, having entered the Silurian at 12,009 feet.

Kent County: Humble's Moore 1, ½ mile west of its Polar field discovery in Ellenburger at 7775-7810 feet, was drilling at 7595 feet. The top of the black shale was tentatively called at 5565 feet, or 72 feet low.

Midland County: Humble's Crespi 1, ¾ mile northwest of its Midland pool flowing discovery in the Pennsylvanian at 11,370-390 feet, was abandoned at 11,620 feet. The discovery zone and the Devonian tested small volume of oil and water. The company is starting Turner 1 two miles south of its discovery as a 12,000-foot Ellenburger project.

Sterling County: Humble's Harris 1, C SE NW H&TC Ry. 114, Block 6, was drilling dolomite at 8405 feet to establish the main water table in Ellenburger, topped at 7955 feet, or 136 feet low to a 8486-foot failure 4¾ miles to northeast. Nominal show of gas was tested by Harris 1 at 8015 feet, but deeper tests showed small amount of sulphur water.

Ward County: Gaylord Chizum et al's University 1, 6½ miles northwest of the Lion pool, was lowering pipe to deepen from 5310 feet after logging small amount of free oil from sand at 5246-51 feet in Delaware, topped at 5192 feet. Water was encountered at 5254-62 feet, and could not be exhausted by bailing.

Shell Oil Company, owner of the Monahans 3-pay field, is starting three 5100-foot Clear Fork tests, and is currently operating 2 rigs, including an Ellenburger project that is using its 202-foot derrick.

Winkler County: Hunt Oil Company's Hill-Gulf 1, 1⅝ miles east of the Weiner field, fulfilled depth contract at 8821 feet, and was running 5-inch to try for completion in the 6100-foot Clear Fork (Tubb) that showed probable oil production on 2 drill-stem tests.

Stanolind and Westbrook-Thompson Holding Corporation's Hendrick 35-A, first deep test for the Hendrick field and currently the deepest active test in the district, was drilling lime and shale at 12,760 feet in Simpson, topped at 12,130 feet.

Wheeler Field: Sun Oil Company's Wheeler 1-A, ½ mile northwest outpost for the Wheeler field, was drilling at 9040 feet to explore the Ellenburger after establishing water immediately below the Devonian and at 8572-8775 feet. This outpost flowed oil from the Devonian logged at 8356-8570 feet. Phillips Petroleum Company's T. P. Land Trust 1-G, ½ mile east of production and in Ector County, tested 2360 feet of 38-gravity oil at 8930-8440 feet in Devonian, topped at 8220 feet, or the highest for the area. This well tested an unusually prolific flow of gas and distillate between 8220 and 8390 feet.

Emperor-Holt Field: Phillips Petroleum Company's Brown-Altman 1, C NW SW PSL 25, Block B-5, and ¼ mile north of the Holt pay discovery, entered this zone at 4765 feet, or 13 feet low, and was surveying hole at 4832 feet to determine if pipe is to be set for a production test. A west offset to the discovery was a failure, and the east offset made a small initial flow.

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☆ North Texas

Considerable Development For Haskell County Area

Young County wildcat has choice of 2 possible oil zones in completion try; revived Haskell County field to receive considerable development; Ellenburger prospect in Jack County has nominal showing.

Young County: A. R. Dillard et al's Killian 1, NW NE TE&L Co. 211, and 1⅞ miles east by south of the Crain field, nearest deep production, opened new Mississippian area in recording steady oil flow when drill-stem test was made at 4940-65 feet. Pipe was cemented on bottom to complete through perforations. This wildcat entered the Bend at 4212 feet, with saturation to 4255 feet,

and showed probable production when tester was used at 4215-37 feet.

Haskell County: Flushed production uncovered by Thos. D. Humphrey's 3-well drilling program in the west extension of the Lawson field promises to be expanded into a sizeable volume of development. Humphrey's Smith 1, half-mile west outpost, flowed 90 barrels oil natural per hour through 2-inch from lime at 2752-70 feet in Adams Branch, topped at 2751 feet, while Smith 2, west offset, flowed 82½ barrels of oil natural through ¾-inch on 3-hour gauge from Adams Branch at 2827-37 feet. Humphrey's Anthony 1, southwest outpost, was awaiting official gauge at 2794 feet, and Anthony 2, north offset, was under way. The latter will be offset to the north by Miller 1. Edward C. Lawson, who completed 3 producers and 3 failures to the east, has started the first of 3 required offsets. The area is dependent upon tank trucks for an outlet, but a major proposes to enter the field with a line. Humphrey is moving in a rotary, and expects to average about 7 days in drilling to the top of the pay, then drill plugs with spudder.

Jack County: Continental Oil Company's Durham-Kempner 1, Chas. J. O'Conner Survey, 3¾ miles southeast of Cundiff, was awaiting orders at 6660 feet in Ellenburger, topped at 6532 feet. Drill-stem test at 6587-6640 feet yielded gas to the surface within 20 minutes for estimated volume of 250,000 feet daily rate, and the stem returned 55 feet of oil and gas-cut mud. This wildcat showed nominal gas in Basal Bend. The showing will undoubtedly result in more tests for the area.

Grayson County: Standard Oil Company of Texas' Mitchell 1, Sherman Ellenburger prospect, was drilling sand and shale at 9155 feet. No important shows have been logged since drill-stem test at 8665 feet yielded gas-cut mud. The company's Grayson County Poor Farm 1, which will test numerous Strawn oil sands passed up by Mitchell 1, was drilling at 1930 feet. More than $200,000 was spent for leases and royalties in this area before the start of deep explorations.

☆ East Texas

Prospects Are Assigned To Travis Peak Tests

Two outstanding geophysical prospects in district assigned Travis Peak tests; Freestone County wildcat reaches Travis Peak without shows; Woodbine prospect in Anderson County encounters water.

Kaufman County: Humble Oil & Refining Company is starting Lon Hale 1, J. S. Ables Survey, to explore the Travis Peak on its faulted geophysical prospect that centers upon the town of Kemp. The company assembled a large supporting block but passed up town lots that have been commanding high prices from speculators. The area has been extensively explored to the Woodbine.

Van Zandt County: Delta Drilling Company was spudding Houston 1, A. L. Martin Survey, to explore the Travis Peak in the Martin Mills area, which has been rated as an outstanding prospect for some years.

Cherokee County: Hintoil Company's Andrews-Pure 1, two miles west by north of Jacksonville, entered the Travis Peak at 9660 feet, and was drilling at 9680 feet. No shows have been recorded.

Anderson County: The Tex Harvey Oil Company's Hall 1, 6 miles south of Palestine, was showing for a failure after reaching water in the Woodbine, topped at 5520 feet with elevation of 337 feet.

Houston County: Humble Oil & Refining Company is starting Legory 1, Francis Hill Survey, 3 miles east of Crockett, to explore the Woodbine on a large lease block.

Wood County: W. J. Weaver, Rube Benton and Delta Drilling Company are starting McKenzie-Sun 1, J. P. Wood Survey, 2 miles northeast of Alba, as a Paluxy prospect. Sun Oil Company and Humble own the bulk of the surrounding acreage, and are helping to finance.

No Equity Rights Held In Expropriated Buildings

The Mexican Supreme Court, acting in a test case brought by a subsidiary of an American oil firm, ruled June 28 that the expropriated company has no equity rights to buildings it formerly owned in Mexico City, Tampico, Vera Cruz and San Luis Potosi. The suit was brought by Compania Transcontinental de Petroleos, a subsidiary of the Standard Oil Company of California, which contended the structures were not subject to confiscation under the Mexican Oil Nationalization Decree of 1938.

In its ruling, the court cited international agreements between Mexico and the United States signed in September, 1943, which made the United States government legal representative for claims by American companies whose property was expropriated.

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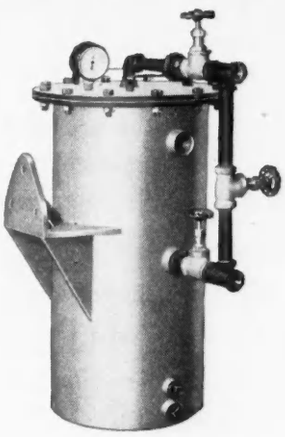

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☆ Ohio

North Perry County Has Three Producers in Week

North Perry County has three Pennsylvania grade producers; flowing well in Ashland field.

Perry County: Four Way Oil and Gas Company's Albert Sturgeon 6, SE SE SE Section 23, Hopewell township, a west offset to Industrial Gas Company's Skinner 1C, flowed 80 barrels after shot. Clinton sand at 2926-66 feet was drilled to 2974 feet. Industrial Gas' Skinner 3C, ¼ mile east of their 1C, came in small for 21 barrels. In Madison township, Morrow and Shrider moved ⅓ mile southeast of their Homer Skinner 1 and completed a 90-barrel well on Anna P. Beard NW NW NE Section 33 in the Clinton sand, 3235-81 feet.

Ashland County: Frank Lyon's A. Carse 1, SW 26, Jackson township, drilled through an unusual thick Clinton sand at 2944-96 feet with two good oil shows. After a 90-quart shot the well flowed from 80 to 120 barrels a day.

Stark County: Belden et al's S. S. Fry 2, ¼ mile northeast from their discovery well in the eastern side of Pike township, swabbed 120 barrels the first 24 hours after shot. Clinton sand was logged at 5004-49 feet.

USGS Makes Report on Airborne Magnetometer

A detailed report on the airborne magnetometer (THE OIL WEEKLY, June 3, 1946) developed during the war for submarine location but since modified and improved for use in making geophysical surveys of potential petroleum and mineral ore deposits, has been published by the U. S. Geolgoical Survey for free distribution to oil operators and others.

The report traces the history of experimentation in adapting the wartime detector to peacetime use, listing the areas surveyed to date and the results, and describing principles of design of the instrument and supplementary equipment and the techniques employed.

The report, prepared by James R. Balsley, Jr., has been issued as Geophysical Investigations Preliminary Report No. 3.

☆ Canada

Follow-Up to Central Alberta Discovery Getting Under Way

The Canadian Government has extended until January 1, 1948, the wartime Taxation Concessions, designed to encourage and stimulate oil and gas exploration and development in the Dominion, which were to expire the beginning of 1947. Their extension is expected to materially affect the scope of exploration in 1947.

Imperial Oil, Ltd., has started its first follow-up test in the vicinity of Provost 1, oil discovery well on the Central Alberta Plains, the Imperial-Provost 2, lsd 1 33-37-3w4th, 1 mile north and ½ mile west of the discovery. The No. 1 well, yielding from a 15-foot sand at the Lower Cretaceous contact (2534-49 feet), is now flowing about 30 barrels of 21-gravity oil daily, with 400 pounds on casing, and 120 pounds on tubing and separator. Gas flow is about 165,000 cubic feet daily. Bottom hole pressure in 24-hour test was 654 pounds.

California-Standard Company, through a wholly owned subsidiary (Caloil Corporation, Ltd.) has joined in development on the Central Alberta Plains. Caloil has acquired a Crown Oil & Gas Reservation totaling 142,400 acres in Twps. 46-47, Range 1w4th, Twps. 44-47, Ranges 2-4w4th, and Twp. 44, Range 5w4th, in the relatively virgin terrritory north of the Wainwright and Provost oil areas, and south of the Vermilion and Lloydminster fields. California-Standard has also taken out a new South Plains block, a 156,410-acre Crown Reservation flanking the big Medicine Hat-Redcliff Gas Reserve on the west and south, in Twp. 10, Range 3w4th, Twps. 9-11, Ranges 4-6w4th, and Twps. 11-14, Range 7w4th.

Foothills Oil & Gas Company's No. 24, lsd 15 4-21-3w5th, eastward extension test on the "East Side Lime Block" of North Turner Valley, was completed as one of the big wells of the field, and provides stimulus for further development in this area. The well, which showed initial flow of 20 barrels hourly on booster gas, flushed at 70 barrels hourly with gas-oil ratio 1210/1 after acid treatments totaling 10,500 gallons. Well topped Madison limestone at 8140 feet, drilled porous zones between 8235-8355, 8575-85, and 8590-8660 feet.

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EXPLORATORY COMPLETIONS

ARKANSAS WILDCATS

Calhoun County—Failure: E. C. Johnston's Freeman-Smith 1, ne nw 27-14s-15w, abnd 2720.

Logan County—Failure: Ark. Okla. Gas Co.'s N. C. Biggs 1, s ne nw 7-7n-27w, abnd 6525.

Nevada County—Failure: Placid Oil Co. et al's Mrs. Levi West et al 1, c nw se ne 19-14s-21w, base massive anhy 2549, Buckner 5110, Smackover 5315, abnd 5337.

Prairie County—Failure: M. W. Martin et al's W. H. Stewart 1, 1600 fr nl 2000 fr wl, 3-3n-5w, abnd 3163.

ARKANSAS NEW PAY TEST

Columbia County—Village Oil Discovery: E. G. Bradham's Tena Crumpler 1, nw nw 15-17s-19w, dual comp in Cotton Valley, perf 8 shots 5565-74, flow 100 bbls 49.2-gr, 5/64-in, cp 1650 lbs; perf 8 shots 6885-92, flow 116 bbls 48-gr, 6/64-in, tp 1950 lbs, td 7492.

CALIFORNIA WILDCATS

Kern County—Failure: Rocket Pet. Co.'s Abrams 1, 26-25s-26e, Jasmine area, Vedder 4328, abnd 4358.

Solano County—Failure: Honolulu Oil Corp.-Barnsdall Oil Co.'s Liberty Farms 3, N. Rio Vista area, 17-5n-3e, Markley 2815, Domengine 4133-4395, M. Hamilton sand 4823, abnd 5000.

FLORIDA WILDCAT

Hernando County—Failure: Ohio's Hernasco Corp. 1, nwc 19-23s-18e, abnd 8472.

ILLINOIS WILDCATS

Clinton County—Failure: H. A. Harmon's Schlafly 1, se se sw 25-2n-3w, abnd 2640.

Coles County—Failure: O. O. Borden's Temple 1, 31-14n-11e, abnd 1205.

Cumberland County—Failure: M. H. Richardson's Barnet 1, ne nw se 25-9n-10e, abnd 1597.

Hamilton County—Failure: Tex Harvey's Wilson 1, ne se sw 23-5s-7e, abnd 3562.

Macoupin County—Failure: J. Q. Gill's Taylor 1, nw ne se 31-9n-8w, abnd 858.

Marion County—Failure: C. R. Winn's Dedmond 1, nw ne se 22-2n-1e, abnd 1980.

Shelby County—Failures: A. J. Hammer's Smith 1, ne se ne 18-9n-4e abnd 1514.

National Consumers Oil's Stewardson 1, sw sw ne 16-11n-4e, abnd 2050.

Wabash County—Oil Discovery: Fred Heldt's Price 1, sw sw ne 12-1n-13w, pump 120 bbls fr Biehl at 1642-55, td 2334.

Wabash County—Failures: Central Pine Line's Bump 1, ne ne sw 9-3s-14w, abnd 3106.

W. C. McBride's Proctor 1, sw ne nw 17-3s-14w, abnd 3170.

Washington County—Failure: Fryer & Simpson's Pieszoahlski 1, nw se ne 29-3s-1w, abnd 1505.

INDIANA WILDCATS

Gibson County—Failure: H. C. Eageman's Mauck 1, sw sw nw 3-2s-11w, abnd 2300.

Pike County—Failure: Blaize Oil Co.'s Blaize 1, 12-1s-9w abnd 1490.

Posey County—Oil Discovery: F. A. Calvert, Jr., et al's Fretageat 1, ne nw se 24-5s-14w, pump 235 bbls fr Pal at 2004-22, td 2029.

KANSAS WILDCATS

Graham County—Failure: Potash Co. of America's Waggoner 1, sw sw ne 36-6s-25w, abnd 4287.

McPherson County—Failures: Galva Oil, Gas & Industrial Co.'s Borth 2, sw sw sw 29-19s-2w, abnd 3025.

Fawcett et al's McBride 1, nw sw se 31-19s-2w, abnd 3040.

Norton County—Failure: Potash Co. of America's Bennett 1, sw se se 19-5s-23w, abnd 3846.

Pawnee County—Failure: J. M. Huber's Blackwell 1, sw sw sw 23-22s-16w, abnd 4097.

Rooks County—Failure: Goodpasure's Bice 1, nw nw sw 10-10s-17w, abnd 3588.

Rush County—Failure: Sasnak Oil Co.'s Krebs 1, se se se 11-17s-16w, abnd 3630.

Saline County—Failure: Dulah W. Geary's Bell 1, sw se se 17-14s-3w, abnd 3763.

KENTUCKY WILDCATS

Breckinridge County—Failure: F. Douthitt's Allen 1, 3-P-35, abnd 1750.

McLean County — Failure: Sohio-Chester Oil's Smith 1, 19-N-27, abnd 2325.

NORTH LOUISIANA WILDCAT

Richland Parish—Gas Discovery: R. T. Sellars' Dr. Thomas Burke 1, se sw 4-16n-7e, no gas rock, Tuscaloosa 2485, perf 2612-16, flow 30 mln gas, rock pressure 595 lbs, td 3318.

SOUTH LOUISIANA WILDCAT

Beauregard Parish—Bilbo Oil Discovery: Magnolia's Powell Lbr. Co. 1, 1980 s 510 e of nwc 17-6s-11w, 2 mi nw N. Oretta discovery, Cockfield pay 8412, perf 24 shots 8412-18, flow 84.81 bbls 43.9-gr, 7/64-in, gor 1231/1, td 5505.

SOUTH LOUISIANA NEW PAY TESTS

Iberville Parish—White Castle Oil Discovery: Shell's Wilbert 23, w fr nec 8-11s-12e, pay 7310, perf 36 shots 7311-20, flow 195 bbls 31.7-gr oil, 0.1% wtr, 8/64-in, gor 445/1, td 7563.

St. James Parish—La Pice Oil Discovery: Shell's Mrs. Henry Schexnayder 4, w fr swc 38-12s-15e, pay 9715, perf 92 shots 9716-29, flow 176 bbls 33.1-gr oil, 0.1% wtr, gor 376/1, td 9715.

MISSISSIPPI WILDCATS

Adams County—Failure: Humble's Adams County Bd. Supervisors 1, sec 47-6n-1w, abnd 10,309.

Clarke County—Failure: Sun's Long Bell Pet. Co. 2, nwc ne 17-2n-17e, chalk 2636, Eutaw 3770, Tuscaloosa 4005, Massive sd 5000, abnd 5563.

Issaquena County—Failure: Stanolind's J. B. Benton 1, 18-9n-6w, abnd 4997.

NEW MEXICO WILDCATS

Colfax County—Failure: American Mfg. Co.-W. J. Gourley's Gourley 1, nw¼ 2-26n-20e, 9.3 mi sw of Colfax, abnd in granite at 3814.

Debaca County—Failure: Frank Griggs-John Darden's State 1, c ne ne 11-4n-26e, elev 4341, San Andres 1237, Blaine 1905, Glorietta 2075, Yeso 2380, Abo 3700, Pennsylvania 4640, abnd 5570.

Eddy County—Failures: Crabb & Crouch's Cowan 1, 4620 nsl 1980 wel 1-21s-28e, elev 3402, abnd 2604.

Mac T. Anderson et al's Anderson-Federal 1, ne ne ne 35-19s-28e, elev 3313, base salt 710, Yates 910, abnd 1885.

Lea County—Failure: Mary E. Wills et al's Flint-Conoco 2, ne se sw 29-20s-34e, elev 3714, anhydrite 1585, base salt 3327, abnd 3368.

OHIO WILDCAT

Medina County—Failure: Wasson and Co.'s Edna Schott 1, nw se 7, Clinton 2832-37, abnd 2908.

OKLAHOMA WILDCATS

Creek County—Failures: Bay Petroleum's Bryan 1, se nw se 11-14n-8e, abnd 3945.

Mid-Continent's Florer 1, 4-15n-6e, abnd 4040.

Cotton County—Failure: Johnson-Fisher's McCullough 1, nw se nw 17-4s-13w, abnd 5005.

Grant County—Failure: C. L. Carlock's Dixon 1, sw sw ne 16-25n-3w, abnd 5138.

Hughes County—Oil Discovery: Mid-Continent's Rogers 1, ne se sw 26-9n-8e, pump 26 bbls fr Gilcrease at 3400, td 4556.

Osage County—Failure: Ryan Consol. Oil Co.'s Osage 11, sw sw sw 12-22n-7e, abnd 3000.

Pottawatomie County—Failure: James S. Wise et al's Meneilly 1, ne nw se 8-10n-5e, abnd 4770.

Seminole County—Failure: Wood Oil Co.'s Whitney 1, se se nw 3-8n-6e, abnd 4350.

WEST TEXAS WILDCAT

Crockett County—Failure: Magnolia's Shannon 1-B, ne ne ne E.L.&RR Co. 26, blk BB, elev 2607, abnd 2676.

WEST TEXAS OUTPOSTS

Andrews County — Fullerton Extension: Stanolind's Lotus Oil Co. 1-A, c se ne PSL 16, 1¾ mi sw prod, elev 3241, Cowden-anhy 2600, San Andres 4350, San Angelo 5600, Woodford 8330, Devonian 8560, flow 160 bbls 41-gr, gor 764/1, ¼-in after 9000 gals acid Clear Fork open hole 6830-7106, td 8593, pb 7106.

Ector County—TXL-Ellenburger Field Extension: Texas Co.'s T. P. Land Trust-Fraser 1-F, c nw sw T&P Ry. 39, blk 45, T-1-N, 1¾ mi n extension, elev 3334, anhy 1410, San Andres 4160, base Permian 7920, Devonian 7926, Silurian 8220, Fusselman 8590, Montoya 8690, Simpson 8910, McKee 9248, Ellenburger 9750, flow 1451 bbls 42.5-gr, gor 949/1, natural via ½-in fr perf 9750-86 and open hole to 9835.

Hockley County—Nw. Slaughter Extension: Alex McCutchin Dr. Co. (was O'Neal Dr. Co.'s) Coble-Magnolia 1, 660 out swc w½ labor 15, lge 66, Hardeman CSL, 1½ mi ne of outpost, elev 3671, pump 85 bbls 30-gr oil, 8000 gals acid San Andrew 4798-4830.

WEST TEXAS NEW PAY TEST

Hockley County—Anton Failure: Humble's Campbell 1, c ne nw sect 116, blk A, R. M. Thomson sur, 1 mi s of prod, elev 3440, anhy 1670, San Andres 3300, San Angelo 4715, Ellenburger 11,410, granite wash 11,610, granite 11,725, abnd 11,730.

WEST CENTRAL TEXAS WILDCATS

Callahan County—Failures: W. T. Gayler-J. C. Leitz's Newman 1, 150 snl 1265 ewl se¼ BBB&C Ry. 128, elev 1837, abnd 820.

Boyd Gillespie et al's Hatchett 1, 1930 snl 660 ewl sect 1, Seale & Morris sur, abnd 1260.

Coleman County — Oil Discovery: Stewart Oil Co.'s Burroughs 1, nw nw sw HT&B Ry. 4, elev 1932, Capps 2945, Morris 2915, L. Jennings 3144, pump 55 bbls 42.5-gr oil, open hole in Jennings 3144-64, td 3487, pb 3164.

Jones County—Failures: Con-Tex Pet. Corp.'s Proctor 1, 330 snl 1070 ewl W. T. Scott sur 2, elev 1639, Dothan 1502, abnd 2101.

Jones-Stasney-Groover & McMordie's Alexander 2, 330 nsl 1100 ewl H. Martin sur 12, elev 1545, abnd 1667.

Taylor County—Failures: S. C. Herring et al's Armstrongg 1, 330 out nwc labor 12, Lge 124, Grimes CSL sur, elev 1875, Coal 2574, Flippen 2590, U. Hope 2665, L. Hope 2744, Gunsight 2887, abnd 2926.

Staley Oil Co.'s Teaff 1, 330 out nwc labor 22, Lge 124, Grimes CSL, elev 1843, abnd 2760.

WEST CENTRAL TEXAS NEW PAY TEST

Hamilton County—Pottsville Oil Discovery: Homer W. Snowden O&G Co.'s Emil Stegeg-muller 1, (OWDD) 3750 fr m/n/sl 660 fr m/e/el of L. W. Dickeson sur 25, 1st oil producer for county, flow 5 bbls oil, 500,000 gas fr 2920-3120, Ellenburger 3266, otd 3065, td 3460, pb 3120.

NORTH TEXAS WILDCATS

Archer County—Failures: Harvey Dr. Co.'s Key 1-K, 150 snl 1500 wel blk 43, Harris sbdn, abnd 1451.

Smiley-Norwood Dr. Co.'s Griffin 1, 1170 out nwc blk 19, Palo Pinto CSL sur, Gunsight 1506, abnd 1979.

Cottle County—Failure: Anderson-Prichard Oil Corp.'s Lynch 1, 1787 nsl 2125 wel sect 66, J. Poitevent sur, elev 1999, granite 5825, abnd 5837.

Jack County—Gas Discovery: Continental's Heath 1, 330 out nec of 59-ac tr, C. A. Beaty sur, 7/16 mi sw Webb pool, elev 1161, Bend 4432, Ellenburger 6020, 1,070,000 dry gas natural open flow Bend 4432-42, td 6214, pb 4460.

Knox County—Oil Discovery: Cities Service's Mulkey 1, c nw nw H&TC Ry. 163, blk 44, 16¾ mi from prod, elev 1569, Gunsight 3375, Canyon 4014, lime 5980, Barnett 6250, Chester 6260, Miss 6360, Ellen 6718, pump 10 bbls 48-gr fr Bend perf 6225-47, td 6785, pb 6295.

Wichita County—Failure: Akin-Dimock et al's Sherrod 1, 150 out nwc labor 2, Lgeg 4, Denton CSL, abnd 1353.

Wilbarger County—Oil Discovery: Nat. Assoc. Pet. Co.'s Schmoker 1, c n½ nw ne H&TC Ry. 111, blk 14, elev 1273, Gunsight 2605, Canyon 3500, Ellenburger 5693, flowed 352 bbls 37-gr, 22 bbls wtr natural thru 14/64-in from Canyon open hole 3502-27, td 5718, pb 3527.

Wilbarger County—Failure: S. H. Fagadau et al's Waggoner Est. 1, 210 nsl 1320 wel H&TC Ry. 1, blk 5, abnd 1850.

Young County—Failure: A. F. Knappenberger et al's Roach 1, 875 snl 937 wel TE&L Co. 1443, abnd 700.

EAST TEXAS WILDCAT

Hill County—Failure: Pobt. M. Bass et al's Gerick 1, 330 out nec 160.4-ac tr, 330 fr nwl 3000 fr swl of E. P. H. Heath sur, abnd 1013.

SOUTH CENTRAL TEXAS WILDCATS

Bastrop County—Failure: C. W. Voyles' C. L. Moncure Est. 1, 2370 fr nl 970 fr el 221-ac lse, M. Rosseau sur, 917 fr wl 12,000 fr nl sur 5000-ac blk, Midway 980, Taylor 1950, Chalk 2880, Buda li 3275, Del Rio 3315, Georgetown 3360, Edwards li 3479, abnd 3579.

Medina County—Failure: Woodrow Glasscock's Carle Mercantile Co. 1, 1050 fr wl 330 fr sl John Twehig sur 111, 330 fr wl 1334.2-ac lse, abnd 2412.

Milam County—Failure: W. F. Glenn's J. S. Jacob 3, 750 fr sl 1100 fr swl 330 fr nwl 50-ac lse, 5 mi e ne Minerva Rockdald fld, abnd in Navarro 1124.

Travis County—Failure: L. M. White's W. R. Nabours 1, 330 fr s&el 80-ac lse, G. Gates sur, abnd 897.

SOUTHWEST TEXAS WILDCATS

Starr County—Failure: Coastal Refineries' P. G. de Saenz 1, 467 fr nl 660 fr el 260-ac lse, being s½ tr 32, porc 107, 1900 fr sl 2875 fr nl 660 fr el tr 32, abnd 4538.

Webb County—Gas Discovery: Dulaney Oil Co.'s State of Tex. 3, 330 fr swl 330 fr sly/sl state sur 838 on 69.5-ac lse, 1 mi sw Aviators fld, pay 1501, comp open hole, no perfs, flow est 250,000 dry gas, open, shut in pressure 50 lbs, td 1560.

Webb County—Failure: Seaboard of Del.'s Donato Benavides 1, 1650 fr nl 1650 fr wl sur 1602 on 640-ac lse, abnd 3166.

Zapata County—Failure: C. H. Lewis' A. M. Bruni Est. 1, 2733 fr swl 1980 fr sel 1500-ac lse, 18,100 fr swl 6100 fr nwl Barrocita Pastr, J. V. Borrego Gr, 4 mi sw Blas Uribe fld, abnd 2301.

LOWER TEXAS COAST WILDCATS

Bee County—Failure: W. C. McBride's L. N. Connally 3, 330 fr nwl 3000 fr nel 690-ac

lse, 3100 ne of Connally 2 dry hole, 1750 fr swl 3900 sel Teodoro Molina Gr, abnd 3943.

Caldwell County — Failure: Stanley A. Thompson's Lydia Dannelly Carvenka 1, (OWDD) 330 fr swl 330 fr sly/wl 55-ac lse, Jonathan Burleson sur, Taylor 1030, Dale 1689, Serpentine 1742-58, Austin Chalk 1758, Buda 1999, Del Rio 2050, Georgetown li 2102, otd 2160, Glenrose 2750, abnd 2965.

Karnes County—Failure: Seaboard of Dela.'s V. S. Kawolik 1, 467 fr ely/nel 467 fr sly/nl 251.8-ac lse, Antonio Hernandez sur, 10 mi ne Hobson fld, abnd 6005.

LOWER TEXAS COAST NEW PAY TEST

Victoria County—E. Placedo Gas Discovery: Stanolind's Vandenberge & Hill 18, 8700 ne alg nwl 995.85-ac lse, fr intersection of nwl with Serrille Crk th 1375 se at ra, 3305 ne of Well 1, ne production, perf 8 shots 6420-24, flow 3,018,000 gas, ¼-in, tp 2045, cp 2415 lbs, td 7524, pb 6792.

UPPER TEXAS COAST WILDCAT

Wharton County—Failure: Shanghai Ltd.'s Joe Adamoek, 330 fr el 990 fr nl 298-ac lse and SA&MGRR Co., sur sect 24, Hangover Bend Prospect, abnd 5020.

UPPER TEXAS COAST NEW PAY TEST

Brazoria County—Stratton Ridge Oil Discovery: E. Cockrell's Seaburn Est. Heirs 5, 815 fr wl 520 fr nl 2757.22-ac lse, J. E. Groce 5-lge gr, pay 4567-4586, perf 28 shots 4576-81, flow 147.72 bbls 29.6-gr, 10/64-in, gor 520/1, td 4640.

WYOMING WILDCAT

Weston County—Failure: W. G. Dunn's Nefey 1, swc 5-41n-60w, Clifton area, abnd 2343.

WYOMING OUTPOST

Hot Springs County—Oil Extension: Continental's Vannoy 2, ne nw ne 3-43n-93w, nw of production, Embar 4095, swab 88 bbls in 14 hrs.

Sweetwater County — Failure: Texas Co.'s U.P.R.R. 2, se nw nw 31-19n-97w, tested wtr in Laramie sd, below depth of disc well, 1 mi sw, abnd 4106.

WILDCAT STARTS

ARKANSAS

Lafayette County: Austin E. Stewart-H. G. Lewis, Jr.'s Ritchie Graocery Co. 2, se sw nw 14-16s-25w, rur 4500-ft test.

Ouachita County: Lion Chemical Co.'s Wesson 1, sw se nw 4-15s-19w, Smackover test.

CALIFORNIA

Kern County: Standard's Anderson 48-17W, 17-29s-21e, Salt Creek area, lcn.

Kings County: Standard's Discombe Community 1, 1-24s-22e, Trico area, preparing to move in equipment.

Tehama County: Superior Oil Co.'s Saldubehere 2, 35-24n-3w, Corning area, ru.

Orange County: Barnhart-Morrow Consol.'s Callen's 1, 18-6s-10w, Huntington Beach area, lcn.

G. D. Murdock's Howell 1, 1-4s-9w, Kraemer area, lcn.

Ventura County: Superior - British - American's Black 4, 13-4n-18w, Del Valle area, grade.

ILLINOIS

Christian County: John W. Myers' Johnston 1, sw sw se 16-12n-2w, lcn.

Clinton County: Texas Co.'s Peltes 1, sw sw ne 16-1n-4w, lcn.

Cumberland County: Victor M. Schaef's Lawson 1, ne ne nw 27-11n-7e, drlg.

Jersey County: Wallace Wright's Walters 1, n½ se 19-7n-12w, lcn.

Marion County: Texas Co.'s Wooters 1, ne nw se 21-1n-2e, drlg.

Monroe County: Keehn & McLaughlin's Mueller 1, 11-2s-10w, lcn.

Perry County: Whitehead & Kipping's Friedman-Russek 1, 10-5s-3w, drlg.

Union County: C. A. Mitchell's Fly 1, nw sw ne 9-11s-1e, drlg.

Wayne County: J. W. Rudy's Fout 1, se sw ne 19-2n-9e, lcn.

INDIANA

Porter County: Walter Egleske's Fee 1, 9-36n-5w, lcn.

KANSAS

Barton County: Sohio's Schneweis 1, sw sw ne 31-17s-11w, lcn.

Harper County: Huber & Kraker et al's Misak 1, ne ne se 21-34s-5w, rur.

Pawnee County: Sohio's Schnack 1, sw sw nw 11-25s-17w, lcn.

Rooks County: Sohio & Rine's Risely 1, sw sw sw 2-7s-19w, lcn.

E. M. Swearer et al's Hoskins 1, sw sw sw 34-9s-16w, mim.

KENTUCKY

Butler County: Ashland et al's Willis 1, 21-K-37, drlg.

Hopkins County: Weinert & Pure's Haywood 1, 24-L-25, lcn.

Meade County: Texas Co.'s Whalen Estate 1, 21-Q-41, lcn.

SOUTH LOUISIANA

Cameron Parish: Claude F. Morgan's Arthur Murphy 1, 330 n&w of sec ne nw 31-14s-8w, ¾ mi n of Morgan's LeBlanc 1 dry hole, 10,000-ft test.

MISSISSIPPI

Clarke County: J. H. White's M. Eddins 1, nw nw 19-2n-14e, lcn.

Issaquena County: Plymouth Oil Co.'s Anderson-Tully 1, nwc 13-9n-9w, lcn.

MONTANA

Toole County: Texas Co.'s Sorrell 1, c ne nw 20-36n-6e, Sweetgrass Hills, lcn.

NEW MEXICO

Eddy County: R. F. Momsen et al's State 1, sw sw ne 36-19s-28e, 1400-ft test.

Willis L. Lakey et al's Mac T. Anderson 1, 2310 nsl 3630 wel 31-19s-28e, 1400-ft test.

OHIO

Carroll County: Frank Lyons' C. C. Allen 1, se se 8, East township, lcn.

Mahoning County: East Ohio's A. & M. Lloyd 1, Lot 55, Austintown township, lcn.

Muskingum County: John Morrow et al Eugene Good 1, se sw 25, Newton township, lcn.

OKLAHOMA

Caddo County: Mason & Warlick's Truett 1, se se se 19-6n-13w, drlg 331.

Cotton County: S. D. Johnson's Cain 1, nw nw ne 10-3s-11w, spud.

Garvin County: R. J. Castleberry's Smith 1, nw ne sw 20-4n-3w, drlg.

W. E. Garrison's Billman 1, ne nw nw 16-2n-3e, drlg.

Kiowa County: Chicago Oil's Tracy 1, ne ne ne 19-5n-19w, drlg 726.

Murray County: Helmerich & Payne's Veal 1, se se se 29-1n-2e, lcn.

WEST TEXAS

Andrews County: Phillips' University 2-M, c se se sect 31, blk 13, Ellenburger test in S. Fullerton-Devonian field.

Placid Oil Co.-Gulf et al's Thornberry 2, c sw se PSL 3, 7500-ft Clear Fork test.

Ector County: N. R. Brasted, Hyer and Hal Hedberg's Henderson-Humble 1, c sw sw T&P Ry. 6, blk 43, T-3-S, 4500-ft San Andres test.

Lubbock County: Seaboard Oil Co.'s J. D. Jenkins 1, 1980 snl 330 ewl L.&S.V. Ry. Co. 27, blk D, Monroe prospect, 7300-ft test.

Midland County: Humble's Mary E. Turner 1, 660 ewl 1980 snl W. T. Holcombe sur 43, blk 37, T-2-S, 2 mi s outpost for Midland fld, 11,000-ft test.

Upton County: Gilcrease Oil Co.'s University-Superior 1, 2343 ewl 330 nsl sect 19, blk 14, 3000-ft cable test.

WEST CENTRAL TEXAS

Jones County: Andrew M. Howsley et al's J. P. Howle-Texaco 1, 330 out nec nw T&P Ry. 17, blk 16, 2600-ft test.

Shackelford County: Dave Bennett-J. W. Sorrells' R. A. Elliott 1, 330 out nwc sect 88, S. Webb and Blind Asylum Lands, 4400-ft rotary test.

NORTH TEXAS

Archer County: W. B. Hamilton et al's Roy Graham 1, 150 out sec F. Gibenrath sur, 1200-ft rotary test.

Baylor County: Paul Scott et al's G. F. Boone 1, 2620 snl 330 ewl Daniel Allen sur, 3200-ft test.

Clay County: Continental's C. E. Crump 1, 990 snl 330 wel blk 45, Grayson CSL sur, 1½ mi se Blue Grove, 6500-ft Ellenburger test.

Cooke County: Burk Royalty Co.'s McGeorge 1, 330 out nwc 20-ac tr, 670 fr m/w/el 630 nsl of W. Moore sur, lcn.

R. M. Igglehart et al's M. J. Endress 1, 1110 nsl 160 ewl of 140½-ac tr, J. C. Richards sur, sd 1760 ft.

Anderson Dr. Co. et al's E. S. Ramsey 2, 800 snl 200 ewl of 80-ac tr, B. Lusk sur, 2500-ft rotary test.

Norwood et al's T. G. Moss 1, 400 w 650 n of nec of S. R. Knight sur, but in SA&MG Ry. Co. A-1218, 1¼ mi ne Leo, testing oil sand 1071-83, 1098-1122, td 1290.

Throckmorton County: Fred M. Manning's McKnight 1-D, 3750 snl 467 ewl sect 2, Day Land & Cattle Co. sur, for Bend test.

Wilbarger County: Nat. Assoc. Pet. Co.'s J. E. Lockett 1, sw se se H&TC Ry. 27, blk 9, 5800-ft Ellenburger test.

EAST TEXAS

Freestone County: O. W. Killam's Fee 1, 3000 wel 330 snl of 272½-ac tr, 2175 e of m/e/wl 1925 nsl Antonio Sanchez sur, 4 mi e Burleson Hill, 5200-ft test, dr 815.

Wood County: W. J. Weaver-Rube Benton-Delta Dr. Co.'s McKenzie-Sun 1, 997 fr n&sl 557 fr e&wl of 52½-ac tr, Joel P. Wood sur, 2 mi ne Alba, mim for Paluxy test.

EAST TEXAS BORDER COUNTIES

Angelina County: Tex-Mo Drlg. Co.'s Long Bell Pet. Co. 1, 330 fr wl 1950 n of swc HT&BRR sur, 5000-ft test.

SOUTHWEST TEXAS

Webb County: Westbrook Oil Corp.'s Mabel Adami 2, 2965 e of wl 2252 n of sl J. H. Gibson sur 337, on 424.93-ac lse, 1700-ft test.

Zapata County: Coastal Refineries' Marrs McLean 1, 330 fr nwl&swl 60-ac lse, 330 fr nwl 1200 fr swl blk 6, J. A. Harvey sbdn of El Javali Gr, 2500-ft test, drlg 1200.

LOWER TEXAS COAST

Bee County: W. C. McBride's State of Tex. 1, 330 fr ne&sel 298.2-ac Texas A&M College tr, Teodoro Molina sur, 4000-ft test.

Brooks County: Sullivan & Garnett's T. S. Proctor 1, 467 fr e&sl lot 1, blk 21, Falfurrias Farm and Garden Trs, Los Olmos y Loma Blanca Gr, 4000 fr sl 1069-ac lse, 8000-ft test.

Caldwell County: O. W. Killiam's Minnie Marshall 1-A, 650 fr swl 168 fr sel 160.5-ac lse, 1400 fr nwl 6000 fr nwl 6000 ne of swc J. Burleson sur, 5 mi w Wela fld, drlg 1010.

Karnes County: Jay Simmons' Edmund Oilnick 1, 330 fr nwl 2070 fr swl 80-ac lse, Antonio Harnandez Gr, lcn.

Kleberg County: Kilgore Developers' H. Lehmann 1, 467 fr n&el lot 9 sect 41 and 80-ac lse, e½ se¼ sect 41, 9000-ft test.

Nueces County: H. R. Smith-W. C. McBride's E. G. Whitten 1, 660 fr sl 660 fr el 160-ac lse, being sw¼ sect 153, F. Z. Bishop sbdn Weil Ranch, 3 mi e of Stratton fld, 9000-ft test.

Wil-Tex Oil Corp. et al's Arthur Merritt 1, (OWDD) 467 fr s&wl 320-ac lse, lots 1 & 4 sect 160, 2½ mi w of Baldin fld, 1½ mi n of Shield fld, L. A. Douglas farmout, otd 6592, to deepen to 8000, mir.

UPPER TEXAS COAST

Brazoria County: Hogg Oil Co.'s Mike Hogg et al 10-A, 1830 fr nl 150 fr el 248.59-ac lse, Martin Varner sur, 1750 ne Well A-3 at West Columbia fld, 6500-ft test.

Ft. Bend County: Jack W. Frazier-Cecil Hagen's C. H. Chernosky 1, 320 fr nw&swl 20-ac lse, out of 312.5-ac Stanolind-Chernosky tr, sw flk Big Crk Dome, Barnabus Wickson sur, 7500-ft test.

Grimes County: Humble's Geo. Sealey Tr. 1, 660 fr wl 1980 fr sl 700-ac lse, Ben F. Smith sur, 8500-ft test.

Hardin County: Humble's Nora J. Liter 1, 377 fr n&sl 39.34-ac lse, W. M. Young sur, lot 12, w flk Sour Lke Dome, 9500-ft test.

UTAH

Emery County: George Callahan's State 1, nec 32-26s-13e, Nequoi Arch, ru 3000-ft test.

WYOMING

Fremont County: General Pet.'s No. 45-25-G Unit, ne ne sw 25-27n-94w, Antelope area, 10,000-ft, mir.

Hot Springs County: Continental's Gov't. 2, sw se sw 27-43n-91w, Lake Creek test to Tensleep, rur.

Park County: Texas Co.'s No. 3 Unit, c nw nw 13-49n-102w, S. Spring Creek, 4000-ft Tensleep test, mim.

THE FORT WORTH LABORATORIES

Analysis of oil field brines, cores, gas, oil and minerals. Field gas testing. R. H. Fash, Vice President; Long Distance 138 823½ Monroe Street, Fort Worth, Texas

HOUSTON LABORATORIES

Analytical and Consulting Chemist Podbielniak Gas Analysis

Oil Field Brines, Waters and Cores Complete Evaluation of Crude Oils

Long Distance 267 Box 132, Houston, Tex.

Mailing Lists—Personnel of Producers, Refiners, Natural Gasoline-Cycling Plants, Oil and gas Pipe Lines, Drilling Contractors, Supply Stores, Machine Shops. Write for catalogue. **Oil Industry Mailing List Company,** Tom Robinson, Manager, 319 Castle Building, Tulsa 3, Oklahoma.

The Oil Weekly's TRADING POST

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CLASSIFIED ADS . . . EQUIPMENT . . . SERVICES . . . PERSONNEL

FOR SALE

■ 5 Complete Reda Pumping Units. Cables like new. 75 and 97 H.P. Motors. Max Steinbuchel, 1905 Park Place, Wichita 4, Kansas. Phone 5-6082.

■ DRILLING EQUIPMENT ready for delivery. Wichita Spudder No. 55. Price on application. Leidecker beam machine, steel frame, 60′ wood mast, spools 5000′ cable, $1500. Star spudder & beam machine, 60′ wood mast, reverse clutch, 4000′ cable, engine, belts, etc., complete, $2750. Star spudder & beam machine, 40′ wood mast, engine, capacity 2500′, $1750. Star spudder No. 42, 36′, Hercules engine, mounted semi-trailer on rubber, $2500. Standard outfit rig irons with 80′ steel derrick, $1750. Moore standard steel derrick with crown block, $750. All sizes cable tools, elevators, cable and equipment. S. W. Pressey—Pueblo, Colo.

■ 80 and 60 acre tracts owned by Dr. J. E. Ludeau and E. Ludeau, in Ville Platte Oil field, Section 28. These tracts lie between Texas Company and Continental Oil Company's producing holdings. Several very good producing wells, Wilcox and Haas sands, close to east line. No dry holes in that neighborhood. Never was leased or drilled. Have been holding for ¼ production—will accept ⅛ for immediate operation. Dr. J. E. Ludeau, c/o Tennison Hotel, Houston, Texas.

■ SPECIAL—New, factory rebuilt, and used Guiberson Radial Air-Cooled Diesel Engines, 125 h.p. to 250 h.p. Excellent power for Sawmills, Oil and Water Well Drilling Crushers, Air Compressors, etc. Located Corsicana, Texas, and Pueblo, Colorado. Large stock New Spare Parts. Prices at 5% to 20% of regular list price. Bernstein Brothers, Pueblo, Colorado, or Bernstein Brothers c/o Navarro Hotel, Corsicana, Texas.

■ FOR SALE—Two 110 H. P. Fairbanks-Morse Oil Engines, complete with generators, switchboards and pumps. One 55 H. P. Fairbanks-Morse Oil Engine, complete with generator, switchboard and pump. Box 36, The Oil Weekly, Houston, Texas.

2 Lufkin SC-26C Units with 7466 Cranks, with two-well and three-well hook-ups complete;
1 Lufkin Unit, #31;
1 Waukesha VIKU Engine;
2 Allis-Chalmers Engines #E-60;
Other equipment, rods, etc. In good operating condition. Complete list and prices on application. W. W. Bradley, P. O. Box 271, Gladewater, Texas.

FOR SALE

50— 500 Barrels
10— 1,000 Barrels
20— 5,000 Barrels
4—10,000 Barrels

Heavy A.P.I. New closed bolted type steel tanks now located at Ogden, Utah. Can quote reasonable prices in order to move from present premises at once.

JOS. GREENSPON'S SON PIPE CORP.
National Stock Yards, St. Clair County, Ill.

RECONDITIONED BOILERS

Four 100 HP, 300# WP, Matched LUCEY Boilers with Oklahoma Certificates. Ideal for Gasoline Plant.

LUCEY PRODUCTS CORPORATION

910 S. Boston **Tulsa, Okla.**

FOR SALE

3—125 HP x 350 WP "Oilwell Boilers" with insurance and State inspection papers. Complete with fittings and burners.

Price $2,500.00 each our Yard, Falfurrias, Texas.

2—125 HP x 250 WP "Oilwell Boilers." Will pass State inspection.

Price $800.00 each our Yard, Falfurrias, Texas.

THE GREY WOLF DRILLING COMPANY
Houston, Texas

FOR SALE—Complete first-class steam rotary drilling rig. This rig equipped with 3 new Kewanee 150 H.P. 350 lbs. working pressure latest type boilers and 10,000 feet new 4½ O.D. best grade drill pipe, with Hughes tool joints attached. One 136 ft. Galvanized API "K" type Lee C. Moore derrick. Absolutely new and never been used. 800,000 lb. capacity. Boilers, pipe and derrick never been used. Rig ready to go. Capable drilling 10,000 to 12,000 feet. Will sell boilers, pipe or derrick separate. For more complete information and prices contact

STROUBE & STROUBE
Box 730, Telephone 1827
Corsicana, Texas

LEASES, DRILLING, ACREAGE, ETC.

■ ATTENTION LAND MEN: At your service on West Coast contacting Lease Interest holders—Texas, Oklahoma and Louisiana. Experience in Titles and Trading. Major Company reference. Address Box 35, c/o The Oil Weekly, Houston, Texas.

FOR SALE

FOR SALE

Two 10" x 4½" x 10" WILSON-SNYDER Boiler Feed Pumps—Used. Excellent Condition.

LUCEY PRODUCTS CORPORATION

910 S. Boston **Tulsa, Okla.**

HELP WANTED

■ REFINERY DRAFTSMEN AND DESIGNERS WANTED. Experienced in general equipment layouts, piping, pressure vessels, pumps, concrete and structural steel design, and material specifications. Location in Mid-Continent area. Salary dependent upon education and experience. Box 45, The Oil Weekly, Houston, Texas.

■ HELP WANTED—Experienced Party Chiefs, Computers, Observers and Shooters needed by newly organized seismograph company. All replies will be treated confidentially. Give full details of experience in first letter and state salary expected. Box 44, c/o The Oil Weekly, Houston, Texas.

■ WANTED: Experienced draftsman for employment in Petroleum Engineering Department. Advancement not limited for employee with initiative. Box 39, The Oil Weekly, Houston, Texas.

■ GRADUATE PETROLEUM ENGINEER over 40 years of age. Specialized in study of oil and gas reserves general Mid-Continent region. To head reserve sectoin large independent company. State full particulars in letter. Box 41, c/o Oil Weekly, Houston, Texas.

■ PRACTICAL OPERATOR with A1 reference has spent years in New Mexico securing a wide selection of choice shallow structures. Now desires contact with Capital to help develop. Room 415, First Nat'l Bank Bldg., Albuquerque, New Mexico.

SITUATION WANTED

■ Land man, veteran, college graduate, experience in leasing and scouting, desires connection with progressive operator or oil company. Address: Box 46, c/o The Oil Weekly, Houston, Texas.

■ INDEPENDENT landman desires connection temporary or permanent with major or aggressive independent company. 14 years experience Texas, Arkansas, Louisiana, Michigan and Mississippi. Have extensive contacts and consider am specialist unitization work and land deals involving difficult individuals. Family man, age 35, with personal car. Will furnish character, credit and business references. Address: Box 38, c/o The Oil Weekly, Houston, Texas.

Trustworthy, reliable, practical oil man, fifty years of age, specialized in secondary recovery, drilling and technical administration, with wide foreign experience, whose former oil properties abroad have been seized without compensation, needs job immediately. Will take any available job connected with production, drilling or administration in the oil fields. Can furnish highest references as to character and ability. Address: Box 37, c/o The Oil Weekly, Houston, Texas.

SERVICES

■ Manufacturer's agents, with technical experience, desiring additional accounts with drilling contractor contacts to sell oil drilling tools in various areas of Texas, Louisiana, New Mexico, southern Kansas, Oklahoma, references. For details address Box 34, c/o The Oil Weekly, Houston, Texas.

New Mayhew Rotary Drilling Rig now available for contract drilling of Shot-Hole or Core Drilling work. New equipment throughout. Experienced drillers. For further information contact . . .

INDIAN DRILLING COMPANY
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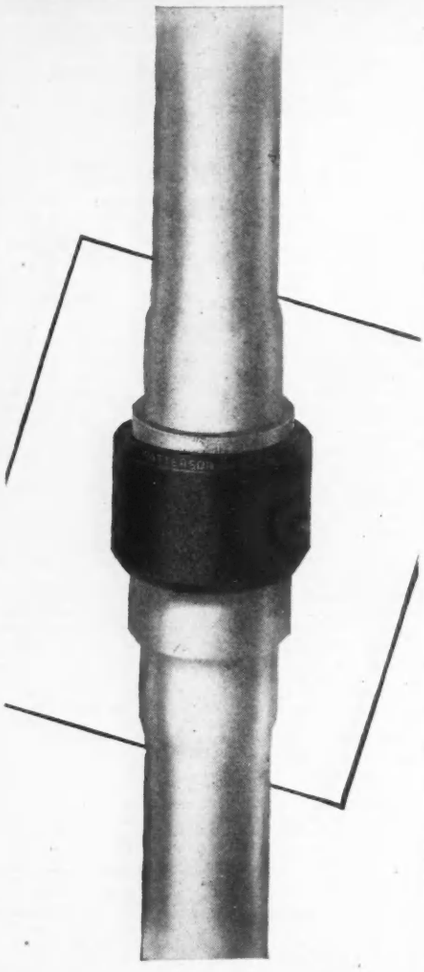


Cut Metal-to-Metal Contact

These oil-proof, insulating, wear-resistant, plastic tubing protectors are an integral part of the tubing collar. Made in all sizes, they prevent the metal-to-metal contact that causes many expensive "wet" jobs in pumping wells. Without this contact, the collars do not wear holes in the casing.

See Composite Catalog

Patterson-Ballagh TUBING PROTECTOR

LOS ANGELES 1 · HOUSTON 10 · NEW YORK 6

SQUEAKS from the BULL WHEEL

This Curious World

There shouldn't be a cloth shortage. What happened to all that cloth they didn't put in women's bathing suits this summer?

And there was the woman who shot her husband because they couldn't afford to get a divorce.

Progress

Grandmother (looking at her granddaughter's new bathing suit): Mary, if I had dressed like that when I was a girl, you'd be six years older today!

Novitiate

Girl: I want to buy some perfume, please.

Saleswoman: We have a wonderful assortment: "Take Me," "My Sin," Breathless," "Scandal," "One Night. . ."

Girl: Yes, but haven't you something for a beginner?

Bow Wow

Lady (holding up a bone for her dog): Now speak! Speak!

Dog: Well, what do you want me to say?

His Bond

"I shall die if you refuse me," he swore.

And sixty years after she refused him, he died.

Wrong Tack

He: Do you know the reason why I love you?

She: My goodness!

He: Don't be ridiculous!

Missionary

He kissed and told
But that's all right—
The guy he told
Called her tonight.

Rib Cribber

Isn't your son studying to be a doctor?

He was, but they kicked him out of school for cheating.

Too bad. What did he do?

They caught him counting his ribs in a physiology exam.

No Noes

He: Do you object to kissing?

She: That's something I've never done.

He: Kissed?

She: Objected.

Kept Woman

I hear Flo and Tom broke up. Is she keeping all the love letters he wrote?

They're keeping her.

Road Block

He: There's a long tunnel ahead. Are you afraid?

She: Not if you take that cigar out of your mouth.

So Glad, Etc.

Hello, Clara! Gracious, you've matured in the five years since I last saw you!

Why, Nell! Do you know I wouldn't have recognized you at all except for your fur coat?

Recipe

Henry is a happy guy,
He has a lot of fun;
He sizes all the cuties up
and never Mrs. one.

More of the Same

Mr. Brown, you've had a very bad smashup, but we managed to bring you to.

I don't remember a thing, doctor. How about bringing me two more?

The Thoughtful Type

Here's a bottle of hair tonic, sweetheart.

What's that for?

Please give it to your secretary. I notice from your coat that her hair is coming out badly.

Sweat Shop Advice

Foreman to New Girl Helper: If your sweater is too large for you, look out for the machines. If you are too large for the sweater—look out for the machinists.

Work-a-Weekday

Employer to prospective employe: I see you have references from three ministers. We don't work on Sundays here, haven't you a reference from someone who sees you on weekdays?

Careful Tear

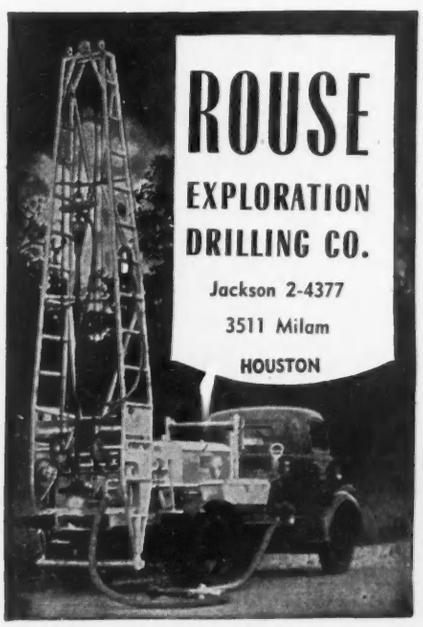
Laundryman: We didn't tear your laundry with our machinery, madam.

Housewife: Oh, you did it carefully by hand?

Consultation, Too

Attendant in filling station: Say, your doctor's over there with a flat tire.

Brown: I would diagnose the trouble as puncture wounds resulting in prolapsus of the perimeter, prescribe surgery followed by the administration of violent flatulents, and charge him accordingly. That's what he did to me!



U. S. Steel's Benjamin Fairless Rewarded for Wartime Service

Benjamin F. Fairless, president of United States Steel Corporation, was awarded the Medal of Merit in recognition of his voluntary service as advisor to the Army's Chief of Ordnance on wartime problems of management, production and supply. The award, accompanied by a citation from President Harry S. Truman, was made by Robert P. Patterson, secretary of war.

Benjamin F. Fairless

As hcief operating official of U. S. Steel during the war years, Fairless headed an organization of more than 340,000 employes who contributed one of the nation's outstanding volume production records, including more than 100 million tons of finished steel. In 1942, without remuneration, Fairless accepted the assignment of advisor to Maj. Gen. L. H. Campbell, Jr., chief of Army Ordnance. He also served as a member of the Iron and Steel Advisory Committee of the War Production Board.

Flotrol Systems Is Acquired By The Warner Lewis Company

The Warner Lewis Company, Tulsa, has acquired full ownership of Flotrol Systems, Inc., and on July 1 will move the latter's headquarters from New York to Tulsa, according to Warner Lewis, president of the Tulsa firm, which has purchased a warehouse and office building.

The Flotrol Company manufactured the Lewis Elcel-So water separator and filter for many branches of the Army and Navy throughout the world. Lewis believes that postwar applications have great potential use in the petroleum and chemical industries, for such services as refineries, gasoline plants, pipe lines and handling of crude oils.

The Warner Lewis Company also represents several manufacturers of equipment for the refining, pipe line, producing and marketing divisions of the oil industry.

Personnel Is Announced for New Bethlehem Supply Company Stores

J. C. Daigle will be manager of a new store at Eunice, La., recently opened by Bethlehem Supply Company. Other personnel members are Curtis Stripling and Durwood Dick, floormen. The store is under direct supervision of J. B. Ellzey, district manager, with headquarters at New Iberia, La.

W. Q. (Bud) Mitchell is the manager and field representative of a new store opened recently at Carthage, Texas. Other members of the store's staff are R. A. Blair and W. H. McDonald, floormen. Mitchell has a wide acquaintance in East Texas, having located at Kilgore for a number of years at the Bethlehem store.

Permanente Cement Gets Award for Safety Record

One of two Pacific Coast industrial firms so honored, the Permanente Cement Company has been awarded the Joseph A. Holmes Certificate of Honor by J. Howard Bird, U. S. Bureau of Mines official, for the outstanding safety record established by its quarry during the past five years. Only one other Pacific Coast company received the award, Union Oil Company, and only two cement plants in the entire United States were singled out for extraordinary safety achievement from 1941 to 1946.

Permanente was cited for the amazing record it established during the period August 15, 1942, to January 23, 1946, when it produced 5,510,565 tons of rock without a lost-time accident. The citation also commends the plant for operating its quarry without a fatal accident since its start on June 1, 1939.

Office Moved

Republic Flow Meters Company of Chicago has moved its branch office in Cincinnati from the Carew Tower to the Boesch Building, located at 3197 Linwood Avenue, and has expanded its office personnel. Frederick H. Meyer has been appointed manager of the Cincinnati district, which includes Central and Southern Ohio and Eastern Kentucky.

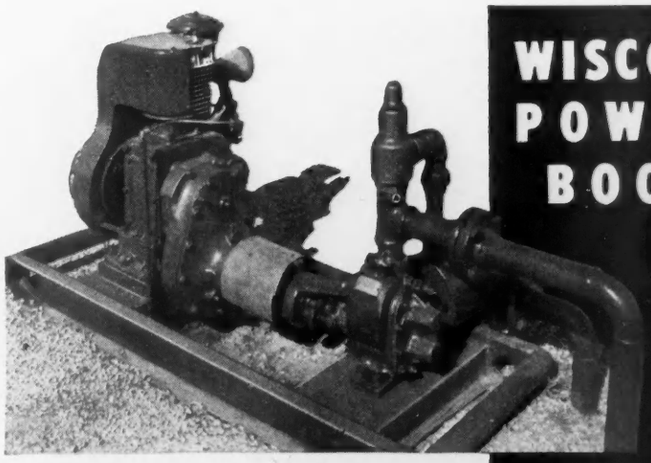
Klausmeyer Succeeds Dingley as Marmon-Herrington President

Bert Dingley is retiring as president of Marmon-Herrington Company, Inc., Indianapolis, and will be succeeded by David M. Klausmeyer, who is going to the company from the Chevrolet Commercial Body Division of General Motors Corporation, where he was plant manager.

Dingley joined Marmon-Herrington in 1932, shortly after the company was founded, as a vice president. By 1942, when he was elected president, the company grew from a small concern into a mass producer of vehicles for virtually every trucking, delivery, and transportation need. He will continue on the board of directors.

Bert Dingley

David M. Klausmeyer



WISCONSIN-POWERED BOOSTER PUMP

The unit illustrated above, built by Harley Sales Co., and operating in the service of a major pipe line company near Wichita Falls, Texas, operates a low pressure rotary pump, boosting 120 barrels of oil per hour at 40 lb. pressure. Dependable, heavy-duty power is supplied by a model AHH (8.5 hp.) single cylinder 4-cycle Wisconsin Air-Cooled Engine, equipped with clutch reduction assembly, direct-connected to the pump.

Wisconsin Air-Cooled Engines are giving good accounts of themselves on a great variety of service applications in the oil field at minimum upkeep cost and maximum engine-hour performance.

Handles 120 Barrels of Oil per Hour . . .

WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

WRITE TO HARLEY SALES CO.
510 Atlas Building, Tulsa, Oklahoma
M & M Building, Houston, Texas
Oil field distributors for Wisconsin Engines and all types of utility units.

MEN IN THE INDUSTRY NEWS

S. Russel (Pat) Casey has returned after four years in the Army to become district geologist in the Gulf Coast area for Woodley Petroleum Company, Houston. Casey enlisted in 1942 and was discharged with the rank of captain. He saw action in the Solomons, Okinawa and elsewhere in the Asiatic-Pacific theater.

S. Russel Casey

Arthur S. Davenport, Tulsa, has been appointed assistant to the secretary of the Interstate Oil Compact Commission. He will handle the Compact's information services and publications and also serve as legal assistant. Formerly a major in the Army Air Forces and a member of the Oklahoma bar, he has had several years' general newspaper experience, and was president and general manager of Rhinehardt's Oil Reports when he entered military service.

Earl L. Chandler has been transferred from the Eastern Division to the Dallas District by the Axelson Manufacturing Company, with which he has been connected since 1926. **William A. (Bill) Russell** will take over the district vacated by Chandler.

Paul Merkert, Jr., and **Robert Miller** have been added to the sales engineering staff of the Cummins Engine Company, Inc., Columbus. Both Merkert and Miller joined Cummins upon their release from active duty with the United States Navy. Merkert, prior to his Navy service, has served with the Murray Corporation as sales engineer on manufacturing accounts. He also was with Caterpillar Tractor Company for several years. He is a graduate of Purdue University, with a B.S. in mechanical engineering. Miller, who also attended Purdue University, was released from active duty with the rank of lieutenant commander.

Sam R. Clement, assistant general branch manager of the Birmingham sales district for Monsanto Chemical Company, has been promoted to assistant general manager of sales, phosphate division, at St. Louis. A graduate from the Georgia School of Technology he served as Monsanto's resident salesman at Atlanta before he was appointed to the Birmingham sales district. He was Atlanta salesman for the Swann Chemical Company from 1931 to 1935 when the company was acquired by Monsanto.

C. Rampy and **John C. Ridley,** both of Houston, have organized the Rampy Drilling Company as a Texas corporation.

Robert H. McLemore, just released from active duty in the Army Air Corps with the rank of colonel, has become associated with Well Explosives, Inc., Fort Worth, as vice president and general manager. He was group commander and aircraft engineering officer with a B-29 bombardment unit on Saipan. Before being called to active duty in 1941, he was associated with Sun Oil Company, Dallas.

Robert H. McLemore

Fred E. Amon has relinquished his position as general sales manager of The Parker Appliance Company to devote his full time as manager of aircraft sales. **Dan W. Holmes,** formerly with the Weatherhead Company, has replaced him as general sales manager. Amon, a native of New Lebanon, Pennsylvania, has a degree in electrical engineering from Rensselaer Polytechnic Institute, Troy, New York, 1931. Holmes, also a Pennsylvanian, graduated in business administration from the University of Michigan in 1931. His first job was with the Russ Manufacturing Company, later bought by the Bastian-Blessing Company of Chicago.

R. N. Duncan was recently appointed manager of the supplies department, Shell Oil Company, Inc., New York. He began his career with Shell in 1927 as a clerk in the cracking department at the East Chicago, Ind., refinery. In 1933 he became the head yield clerk in the main office at that refinery and two years later was appointed senior clerk in the manufacturing department. In 1940, Duncan was transferred to New York as head supply and statistical clerk in the supplies department, and later became acting manager of the department, which position he retained until his present appointment.

Gene M. Kennard is supervising the oil test drillings on Everett Thurman acreage in the Piney Fork section of Kentucky. He has recently been elected vice president of Kennard Oil Company, Inc., Evansville, Illinois, and will also head the company's geological department. He is back in the states after 28 months' active duty in the Southwest Pacific area. He has a degree in petroleum geology from University of Oklahoma and has done graduate work at the University of Illinois. **J. L. Kennard,** Piney Fork enterpriser, has a program for drilling 10 wildcat blocks shortly and for further exploration in Crittenden and Caldwell counties.

Donald S. Nutter, formerly senior exploitation engineer in the Los Angeles Basin for Shell Oil Company, has been transferred to a similar post in the company's San Joaquin Division, with headquarters at Bakersfield, California.

GIVE ME A LUFKIN TAPE WITH THE CHROME WHITE LINE THAT IS DURABLE
JET BLACK MARKINGS ON CHROME WHITE SURFACE... EASY TO READ
CHROME PLATED STEEL LINE WILL NOT CRACK, CHIP OR PEEL
LUFKIN
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Joe A. Huitt, former superintendent of shops for Deep Rock Oil Corporation at Drumright, Okla., has been transferred to Tulsa and elevated to the position of assistant to the vice president in charge of production. Huitt, who will aid **Richard K. Huey,** entered the oil business at Bristow, Okla. He then went to Cushing as a field clerk, and in 1929 joined Deep Rock.

Joe A. Huitt

R. D. Rockwell, formerly superintendent of purchases for the Todd-Houston Shipbuilding Corporation, is associated with Roy A. Berentz Company, Houston, in the purchase and sale of new and reconditioned industrial electric power equipment.

Paris E. Letsinger has been elected a director of the Cummins Engine Company, Inc., Columbus, Ind., following his retirement as vice president in charge of distribution because of his health. He has been connected with the company for 13 years, and before that was associated with The White Company, being their district manager in San Francisco for 10 years. At a testimonial dinner, the Cummins dealer organization presented Letsinger with a custom-built "jeep" and trailer, designed especially for transporting and showing his prize flock of registered Hampshire sheep at stock shows throughout the country.

Paris E. Letsinger

George W. Young has been appointed chief engineer of tools and methods of the Indian Motorcycle Company of Springfield, Mass. He comes to Indian from Fox Industries of Philadelphia, where he was general manager. Prior to that he was superintendent of General Machine Products and in charge of tool work at Wicaco Machine Corporation, both Philadelphia Companies.

Joseph L. Quinn, Fort Worth district landman for the Warren Petroleum Corporation, has been transferred to Wichita Falls to assume charge of the North Texas district land office of Hanlon & Buchanan, Inc., recently acquired by Warren along with other affiliated companies.

Ray E. Miller is taking over as Gulf Coast area vice president for Warren Petroleum Corporation. He was formerly vice president in charge of sales for Hanlon-Buchanan, which Warren recently purchased.

G. A. Berg has resigned as chief geophysicist with the Standard Oil Company of Texas to enter business for himself. He will head the Berg Geophysical Company, which was recently organized and granted a charter. The company will offer seismic, gravimetric and magnetic surveys and will be located at 2626 Westheimer, Houston, after August 1.

W. T. Holliday, president, and **S. A. Swensrud,** vice president in charge of production, of the Standard Oil Company (Ohio), recently toured Sohio Petroleum Company's Gulf Coast properties. They were conducted on the tour by **George S. Buchanan,** Houston division manager for Sohio.

H. F. Fortinberry, field foreman for the Gulf Oil Corporation in the McElroy sector of West Texas, has been transferred to Wichita Falls as North Texas district superintendent. He succeeds **C. M. Foster,** who will be assigned to the McElroy area.

H. D. Bell, assistant superintendent of production for the Gulf Oil Corporation in North Texas, has been transferred from Wichita Falls to Borger to fill a similar position in the Texas Panhandle, succeeding **T. A. Watkins,** who will fill the North Texas vacancy.

Ed. N. Foster, assistant purchasing agent for the Gulf Oil Corporation in the Fort Worth district, has been transferred to Houston to become assistant division purchasing agent.

C. C. Keech and **F. D. Baker,** both of Borger, Texas, have organized the firm of Baker & Keech, Inc., to engage in drilling operations.

Clement M. Gile has been elected vice president of the Gulf Oil Corporation and the Gulf Refining Company, and also vice president and a director of the Gulf Research & Development Company, succeeding **W. V. Hartmann.** Gile will be in charge of marketing. He joined the Gulf companies in 1926 as assistant to the general manager of sales. He was appointed general manager of refined oil sales in May, 1933. He has been vice president of the Gulf

Clement M. Gile

W. V. Hartmann

Tire and Supply Company since it was organized. He is a graduate of Yale University. Hartmann, retired, has ended a career of 58 years in the oil business, 43 of them with the Gulf organization. He was vice president and member of the board of directors for Gulf Oil Corporation and Gulf Refining Company; also a director of Gulf Research & Development Company, and a director of the Gulf Exploration Company, and Gulf Tire & Supply Company.

George P. Torrence will rejoin Link-Belt Company, Chicago, on July 1 as executive vice president, and will become president November 1, when **William C. Carter,** president, will retire in

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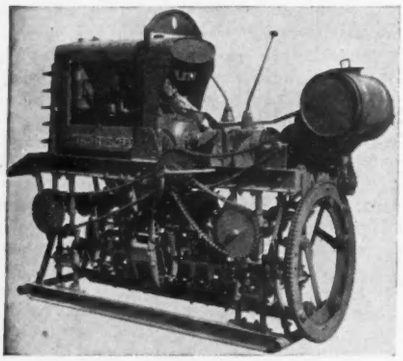

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accordance with the company's retirement plan. The board of directors created an executive committee consisting of directors **Howard Coonley, Russell Livermore** and Carter, with the latter as chairman. Torrence was with Link-Belt from 1911 to 1936, when he resigned as president. Since 1936 he has been vice president and general manager of The Rayon Machinery Corporation, subsidiary of The Industrial Rayon Corporation, and president of The Cleveland Pneumatic Tool Company.

»

Frederick A. Stevenson was elected a member of the executive committee and **John L. Farrell** a director of Carter Carburetor Corporation, subisidiary of American Car and Foundry Company, New York. Stevenson is president, member of the executive committee and a director of American Car. Farrell is a member of the law firm of Hardy, Stancliffe and Hardy, and also a director of Edward Ermold Company of New York.

»

W. W. Welch, district land agent at Shreveport, Louisiana, for Shell Oil Company, has been transferred to Tyler to replace **E. E. Casey,** who has resigned to enter private business. **J. H. Hesterly,** area land agent in Houston, has replaced Welch in Shreveport, and has been replaced in Houston by **F. J. Nicholson,** district land agent at Salisbury, Maryland, an office which has been closed for the present.

»

Taylor J. Hughes, John T. Kuhn and **John C. Randolph,** all of Houston, have organized the Tex-Mo Drilling Company with headquarters in the West building, Houston.

»

C. O. Lake, Andrew Nelson, L. T. McIntyre and **William H. Armstrong,** of Shell Oil Company's California Coastal Division, recently received diamond emblems from division manager **F. R. Schmieder.** Their combined service records total 100 years.

Paul Kelting has been appointed field manager of the oil field products division of Thermoid Company, Trenton, N. J., and **Earl Johnson** is the company's oil field product sales representative in Oklahoma. Kelting has been with the company since 1945 as district manager of the Houston branch. He will supervise sales and service activities in the Mid-Continent and Gulf areas. Johnson went to the company from Green Head Bit and Tool Company. His headquarters are at Oklahoma City.

Paul Kelting

»

K. G. Knight, A. Graham and **R. Johns,** all of Austin, have organized the Shamrock Production Company as a Texas corporation.

Deaths

Chester C. Hester, 54, Oklahoma oil lease broker and independent oil operator, died in an Oklahoma City hospital July 1 from injuries received in a fall. He had been in the oil business for 26 years and was a former member of the State House of Representatives from Blanchard, in McClain County.

»

Richard Mauldin, 26, Oklahoma City, died June 26 of injuries suffered when he fell 75 feet from the top of an oil derrick in Oklahoma City. He was an employe of the Phillips Petroleum Company, well servicing department.

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